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The Planters' Chronicle.

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THE U. P. A. S. I.

(INCORPORATED.)

Scientific Officer's Papers.

LXXXVI.—ARSENITE OF SODA AS A WEED KILLER:

A paper, No. LXIX, on this subject appeared in the *Planters' Chronicle*, Vol. VI p. 394, in which the results obtained with Arsenite of Soda in Hawaii by Mr. Wilcox, the Special Agent in charge of the Agricultural Experiment Station, were quoted, and it was suggested that, bearing in mind the difficulty and cost of keeping down weeds and more especially grass on estates, a few carefully conducted experiments with the spray were needed in Southern India.

The subject was taken up in Coorg and I am indebted to a correspondent for the following interesting report upon the results obtained:—

"The experiment commenced on 19th August. The materials used were four Four Oaks Knapsack Sprayers at Rs.43 each. The mixture I used was in accordance with your directions, *i.e.*, 1 lb. of White Arsenite and 2 lbs. of common Soda were boiled in 1 gallon of water until mixture was clear. This was our Stock and in application 19 gallons of water were added to this. Experiments were conducted in Ceará Rubber where there was heavy grass of all sorts.

" (*a*). The 1st Plot of one-fifth of an acre, containing high grass 3 to 4 ft. high and which had been allowed to grow rank was sprayed on 19th August. There was a slight shower at night some 12 hours after application and the weather was drizzly for the next 2 days. Grass showed signs of dying on 2nd day, having the appearance of becoming rotten and of a black colour. This continued for some days until the plot was a mass of decaying grass, etc. I hardly expected such results in that weather! On the 26th of August, the weather being fine and some of the Creeping Grasses having commenced to shoot out again, I gave the same plot another dose, and again rain fell at night and the next day also. However, the day of application was hot and sunny and all the green shoots *at once* died back, the small Goat Weeds, which had come up after the first dose, being killed within a few hours. After this application, we noticed that the Dubby had died back a great deal and that the deep roots of this grass were quite rotten and destroyed. Rain did not permit any other work being done before 29th September, when No. 3 dose was applied, the dead growth having been first of all cleared away to allow the Arsenite to penetrate. This seems to have settled the matter, as the weather was fine, and at the present time of writing the place is quite bare and there is practically nothing in the way of grass, weeds, or jungle growth about there.

" (*b*). Four-Fifths of an acre was then treated with the Mixture, the grass having previously been ***very roughly*** cut and beaten down. Weather

DISTRICT PLANTERS' ASSOCIATIONS.

Wynaad Planters' Association.

Proceedings of a Meeting held at Meppadi Club on December 26th, 1911.

PRESENT.—Messrs. Bownass, Darkin, Gillatt, J. C. Parker, G. C. Parker, Powell, Stewart, Vernede, Walker. and C. E. Abbott, Honorary Secretary. Honorary Member: Mr. Blake. Visitors: Messrs. Briggs and Gould. Mr. J. C. Parker in the Chair.

1735. *Proceedings of last Meeting* were confirmed.

1736. *Delhi Durbar Celebrations.*—Mr. J. C. Parker gave an account of the distribution of the funds collected for this purpose. He complained that no English translation had been sent to the officials at Meppadi, but only a Malayalam copy, which had to be translated locally. It was decided to report this to the Collector.

1737. *Roads: Coorg-Kortikolam Road.*—The Honorary Secretary stated with reference to Mr. A. H. Jackson's complaint about this road (para. 1727) that he had heard from the District Board Engineer Mr. Blake enclosing copy of a letter from the President. The Board has been obliged to take over this road from the Contractor; the work is being done departmently, and it is hoped the road will soon be in fair order. The members present then discussed various questions connected with Wynaad Roads with Mr. Blake, District Board Engineer. Mr. Blake was cordially thanked for attending the meeting and for the information he had given.

1738. *European Doctor.*—Mr. Stewart brought forward a proposal that a European Doctor be engaged for the District on a salary of Rs.500 a month. After some discussion it was decided to appoint a Committee consisting of Messrs. Malcolm, Abbott, Gillatt, Waddington and Mr. Stewart as Secretary, to see what can be done and to report to the Association later.

1739. *Collector of Malabar's Tour.*—Mr. Innes will reach Meppadi on January 3rd, 1912, will halt at Meppadi on 4th and 5th, proceeds to Vayitri on 6th, stays there till 9th, when he goes to Kalpatty. Messrs. J. C. Parker and Abbott were appointed as a deputation to see Mr. Innes on the subject of Wynaad Road allotments.

1740. *Attesting Authorities.*—Messrs. Darkin and G. C. Parker have been appointed by Government to attest contracts under Act I of 1903.

A vote of thanks to the Chair terminated the Proceedings..

(Signed) J. CARSON PARKER, *Chairman.*
(„) C. E. ABBOTT, *Hon. Secretary.*

1741. NOTE—*Non Service of Warrants.*—Since the Meeting a letter has been received from Mr. D. Squire, Superintendent of Police, referring to the Proceedings of November 8th, 1911 (para. 1728) asking if the Warrant against Shengalli was endorsed to the local Police, as no entry of it is to be found in the process registers of the Wynaad Police. He adds: "The forwarding of warrants for execution through the District Office causes a slight delay; but the receipt of the Warrants is noted in the office summons and Warrant register, and steps taken to execute it are thereby able to be checked on receipt of the Inspector's return of unexecuted warrants. Whereas if issued direct to the local Police it is not improbable that to suit their own convenience they may suppress and deny the receipt altogether."

Members are requested to note this. Mr. West writes that Shengalli's agreement is in court and he is unable to give the information asked for.

CORRESPONDENCE.

Labour Problems.

Dear Sir,—Once more I am troubling you for space instead of the daily press, because my object concerns the planting community more than the general public.

The *Madras Mail* devoted a leading article to "Planters and their Labour" on the 14th instant, which deserves the attention of every one of us. What is being done by us to counteract the wiles of Ceylon and Malayan Planters in the way of recruiting and keeping coolies, may be apparently but little in the eyes of those who are not taking a hand in the game. What is apparent, does not disclose the whole of what is being done. The only district which has taken the labour position seriously in hand so far as I know, is one which has declared itself satisfied with the existing conditions, and the Madras Government says so too. The Kanan Devan District has laid out and pursued a settled policy since 1903, which is before even the Ceylon Commission started organizing their forces in South India. It is because of its success in these efforts, that the Kanan Devan Planters' Association evidenced the greatest alarm at the attempt made to force Act I of 1903 or any legislation upon its unwilling members. All that District wants, is to be left in peace to work out its salvation, which in my opinion it is quite capable of doing. I should not be confident on this point were it not that the policy fixed and pursued in the past, has proved eminently successful.

Coming to personal matters, the *Madras Mail* mentions my withdrawal from the "Committee of two" appointed to consider the Labour problem. The appointment of this Committee and my being included in it, took me by surprise. and I had nothing to say at the moment, but on mature consideration I saw nothing for it but to withdraw. It was an attempt to make the North pole and South pole meet. I asked myself what I was going to say to the Anamalay delegate, and came to the conclusion, I could only say: "You may come my way if you like, but if you don't like, then go your own way." In reply he could have asked what my way was, and I could only have quoted my writings in the press and my speeches at Bangalore. These are as well known as I can make them and reiteration would add nothing to them. The material is in any case at his or any one else's disposal, a meeting with him therefore must have proved abortive, it was a foregone conclusion that it would be so. To meet him with these feelings would have been to meet him with my tongue in my cheek. I preferred to withdraw.

The *Madras Mail* is doubtful about my advertising scheme. If any Association shares these doubts there is still time to back out of it. For myself, I have tested the usefulness of advertising, and I brought the proposal forward at the Bangalore meeting because I was satisfied with the result and offered to others the chance of sharing in what I considered a good thing. I shall continue to advertise among the Agricultural classes, whether others do so or not. If any one expects that all there is to be done is to distribute pamphlets in a village, and then wait to be deafened by the demand for work, he is much mistaken. The advertisement is only a way of introducing the subject, and the beginning of business. The "follow up" by Maistries and Kanganies, the conditions on the Estate, the pay, the prospects, and other items too numerous to mention, are all important factors, and weakness in any one of them means failure. Does any one suppose that the advertisements of, say, Beecham's pills would pay, if the form in which they were offered and their subsequent performance were not satisfactory ?

The *Madras Mail* is nervous about the future, a nervousness I do not share. So far as my own District is concerned, we have not left unconsidered the possible activities of our competitors, nor the direction towards which their activities tend. Ceylon's present predicament is of tremendous interest and proves to my mind the absolute uselessness of all its passed legislation. It is almost sickening to think of all the brain power and time that has been wasted over the "Labour Ordinance" in Ceylon. Now that they turn their thoughts to more practical schemes, Planters in Ceylon find themselves seriously hampered by their own previous treatment of the Labour Question. The proposed "abolition of coast advances" alone will cost the community something like Rs.50 down per acre all round, and these "Coast advances" have for years been borne on the books of Ceylon Estates and Companies, as good assets. It is proposed in future that advances made to coolies will not be charged to them, the money will be "backsheesh." The cost of coolies travelling from their villages to Ceylon will be a normal annual item of expenditure. How Ceylon will deal with these proposals, and how emerge from her present position, we must "wait and see." But we need not wait to decide what we shall do in certain eventualities. Each District must decide that question for itself. Appeals for legislation, based on registration, or on finger prints, or on impressions from any other part of the cooly anatomy, will not do any of us any good. If our Estates attract the cooly, we have no labour difficulty; if other places offer better attractions, to those places the labour will go.

Each District, each Estate, each owner, each Superintendent must consider if his own conditions offer sufficient attractions to Labour. If not, he must see that they do. This is the proper line of thought and not legislation, which should be dropped altogether. You see how opposed I am in principle to the Anamalay Planters' Association, who have taken the strictly parliamentary method of refusing an increase in supplies to show their dissatisfaction. They want some guarantee that the U. P. A. S. I. will take up a strong line of action about legislation and threaten withdrawal altogether if it is not done. So the *Madras Mail* and the Anamalays are in agreement. Nevertheless I some way or another can't help thinking that they are on the wrong tack.

Am I ploughing a lone furrow?

AYLMER Ff. MARTIN.

Srivilliputtur, 24th December, 1911.

ELECTRICITY FOR PLANTS.

For some years past Dr. Franz Muller, of Frankfurt, has been working at experiments with a view to promoting the electro-chemical culture of plants. He seems now to have succeeded, and in a most interesting lecture at the Royal Botanical Gardens lately Mr. Emil Lawitz explained the discovery. It is one which may prove of profound importance to the tropical planter. By means of an electrical apparatus it is possible to invigorate trees or plants, to pump food into them to promote their growth, and to induct insecticide for the purpose of exterminating all parasites. The process accelerates the germination of seeds; regenerates and revitalises plant life; exterminates parasites and treats the soil. The lecturer said that one test was made in the last few weeks with old wheat, from which, in the ordinary way, 30 per cent. at most could have been expected to germinate. After treatment the astonishing result of 76 per cent. was obtained, and these seeds produced, within two days, very robust and sturdy seedlings.

TEA.

America's Green Tea Muddle.

Mr. Thos. Martindale, of Philadelphia, wrote early last month to the New York *Journal of Commerce*:—

The writer has but recently returned from a trip to Canada, and while there he called upon some of the most extensive tea blenders in the Dominion. One of them was jubilant over an increase in sales during a period of less than eleven months which closely approximated a million pounds—to my mind, a sure index that the people of Canada, on account of the high price of coffee, are substituting tea for the nerve-destroying coffee berry.

Another one was felicitating his firm upon their ability to buy Chinese green teas, on account of the embargo in the United States, at almost "any old price," as he put it.

I was shown Ping Suey teas with a fairly good leaf bought at 11½c. pound laid down and some very choice Sow Mee Young Hysons at 14 cents. pound. Canada having a duty of 10 per cent. upon all teas entering her ports, this amount would have to be subtracted to show the actual price of the teas. These greens were being used in certain widely distributed blends, and thus the average cost price was kept down, in spite of the advance in India and Ceylon tea, the use of which growths largely predominate in Canada.

Another peculiar incident was an innovation in the fact that the Chinese shippers of tea were also sending over their own blends of green and black China teas, in which the green teas were mixed in a proportion of 40 per cent. to 60 per cent. of blacks.

In England a totally different tea situation is presented, which is giving the large blenders and dealers in the mother country much concern. It must be remembered that the duty of 5*d*. or say 10 cents. per pound is levied upon all teas "in the tight little isle," no matter how poor or how good they may be, and also that the standard price for popular blends of teas in that great tea drinking country is 1*s*. 4*d*. or say 32 cents. the pound.

There are now no Indian or Ceylon teas to be had of even the poorest grades at auction under 8*d*. farthing, or say 17 cents—in addition to the sale price, ¼*d*. has to be added as commission, thus bringing the cost to 17½ cents. plus 10 cents. for duty, 27½ cents. Then comes the cartage, insurance and storage charges, next the packtng in lead foil packages, then the boxing of the same for shipment, then the delivery cost to the purchasers wherever they may be, and you have a cost price so perilously near the consumer's arbitrary price of 1*s* 4*d* that it is doubtful whether the dealer or retailer gets his own money back or not.

As the years go by it is but a short time since a firm dealing largely in oleomargarine in England commenced to sell teas—probably as a lure to increase their margarine trade. At first they purchased their supplies from a large blending firm in London and soon acquired a trade which equalled at least the equivalent of 500 chests, or say 50,000 pounds, of India and Ceylon teas per week. They finally commenced to pack their own teas and gave better quality and value than they had ever done previously. The prices of India and Ceylon teas commenced to advance and are still advancing, and other blenders began to mix Moning congous with their British grown teas, so as to keep the cost price within the 1*s*. 4*d*. requirements. I am informed that the margarine firm paid but scant attention to this method of decreasing the cost, but kept up their standard to the top notch all the time—indeed, because they could afford to do it by reason of their profitable trade in margarine. Finally even the liberal mixture of congous with the Indias and Ceylons would not enable the blenders to get out with a profit and now they are advancing the prices, one great blender only last week having raised his values upon all his teas to the equal of 5 cents. per pound. In the meantime the trade of the margarine dealer, it is said, has increased to the almost incredible amount of 5,000 chests per week, or 500,000 pounds. Just think of it—one firm blending, packing and selling at retail 25 tons of tea in one week at 1s 4d the pound, or about $160,000. This firm is said to have declared a dividend in spite of the constantly advancing prices of tea of 100 per cent. but of course this was earned upon their margarine trade.

In our latest advices from Shanghai under date of October 31, Westphal, King & Ramsey, Limited, of that port, state, that "during the second half of the month of October revolutionary troubles, causing a run on native banks which resulted in many failures, had the effect of hardening the market. Tea men having no confidence in banks preferred to hold cargo to notes, etc., and many having previously sold their holdings speculatively invested in tea." . . .

In a study of the tea situation up to October 31, the same firm of tea buyers and shippers give the number of half chests of congou tea now on hand in that port as only 338, or about two-thirds of a carload; or Ping Suey greens there were 63,115 half chests, and of country greens 3,896 half chests.

Last year there were shipped to the United States from Shanghai 4,628,100 pounds of black teas and this year 6,279,700 pounds, an increase of 1,651,600; but last year we took from the same port 7,601,000 pounds of green teas and this year only 574,100, pounds or a difference of 7,126,900 pounds. Thus the total shipment of blacks and greens together for last year show 12,229,100, while those of this year show only 6,853,800, or a shrinkage of 5,375,300 pounds, and it will be borne in mind that on the 31st of last October there were but 338 packages of black teas to come out, while at the same time last year there were 11,051 half chests of congou in stock, or close to 1,000,000 pounds. It should be noted that:

France, Russia, North Africa ports ... ... 26,962,800 lbs. blacks
Bombay and others took last year from the
same port ... ... 15,067,500 lbs. greens

while this year the same buyers took:

26,453,900 lbs. blacks
21,696,700 lbs. greens

an increase in greens of 6,629,200 pounds, and a total increase in blacks and greens of 7,111,300 pounds. These figures show conclusively that other countries are taking the greens in excess of their requirements of former years, because of their cheapness from having lost the American market; in addition to this, the increased consumption all over the world does surely show that to many the almost prohibitive price of coffee is driving coffee drinkers to the use of tea.

The above data is at this time especially interesting as showing what we may reasonably expect values to be in the near future, no matter how the "green tea muddle" may be settled, as the quantity of greens that can reasonably be admitted into this country under the existing restrictions cannot have any permanent depressing effect upon the market in view of the increased consumption and the depleted stocks.

It is but two years since one dealer alone in New York was credited with owning 50,000 packages of congous, and other large holders held heavy stocks as well, but all of this great accumulation of stocks has disappeared, and in addition thereto there are no excessive supplies of British grown teas bearing the English market as there were at that same period.

As it is now generally believed that the Treasury Department will for the future enforce the law against the admittance into the United States of artificially coloured teas, the trade will soon be able to get their bearings, so as to be able to buy and sell tea without being under the hardship of having to constantly guard against a chance of the Department showing a leniency in favour of one or two firms in the admission of so-called coloured teas, to the detriment of all other importers.

The London Tea Trade Dinner.

About 150 representatives of the various sections of the tea trade attended the fifth annual dinner held at the Criterion Restaurant, London, W., on November 24th. Mr. William James Thompson, who presided, proposed the toast, "The Tea Trade." He said that the little leaf gave food and consolation to people all the world over, provided employment for millions of others, including themselves, and found employment also for vast sums of capital. Tea was a very large and a very interesting subject; he could boast that he had studied it for 50 years in Mincing Lane, and could keep them there until the small hours of the morning listening to his reminiscences about the article. But, fortunately for them, the speeches on that occasion had to be short ones, for the committee had applied the closure, and they all knew how useful the closure was, how many clauses of a much-discussed measure were passed by it, including the printers' errors, and how many millions of pounds sterling to be paid by the unfortunate taxpayer were voted under it. As to the history of tea, they could go back for a very long period. In China tea was known some four or five thousand years ago; it was particularly referred to in the poems of Confucius some 500 B.C. The first time tea was known in England was in 1664, when the East India Company made a gift of 2 lbs. 2 ozs. of tea to the merry monarch. They were evidently very careful as to their weights in those days. In 1666 22¾ lbs. of tea reached this country; in 1678 50 cases of tea were enough to glut the market. Tea came into this country very slowly for many years, and, indeed, it was regarded with much disfavour in many quarters. In 1678, for instance, one writer complained of certain friends, who

CALLED FOR TEA INSTEAD OF PIPES AND BOTTLES

after dinner, and characterised the desire for tea as a base, unworthy Indian practice, "which I must ever admire your Christian family for not admitting," and ending with a sigh that all nations were growing so wicked as to have some of these filthy customs. In 1722 a doctor wrote that tea is particularly "the cause of hypochondraiac disorders—and is not less destructive to the animal economy than opium, or other drugs we have at present learnt to avoid." Another said it tended to spirit drinking by causing weakness and debility of the system. In 1756 Jonas Henry wrote that men seemed to have lost their stature and women their beauty owing to their liking for tea, while what Shakespeare attributes to the concealment of love is in this age more frequently occasioned by the use of tea. But tea had at least one friend, for Dr. Johnson was a hardened and shameless tea drinker, who for 20 years diluted his meals with the infusion of this fascinating plant: whose kettle had hardly time to cool, and who with tea amused the evening, solaced the night and welcomed the morning. In 1820 the belief was current that tea could be produced in India and, in 1826, in Java, but it was not proved until 1834. In 1836 one pound of tea was sent from India; in 1837, 2 lbs.: in 1838, 12 boxes; in 1839, 95 boxes; and in 1840 the first tea sale was held in Calcutta, where some 6,000 lbs. from Chutwa were offered. Some very good prices were got for tea in the days gone by, for quite recently he was looking through an old catalogue of Messrs. Joseph Travers and Sons, in which tea was quoted from 6*s*. 1d. to 13*s*. per lb. That was in 1814. But they would all wish to know something about the future of tea. As to that he had done his best to get a little outside information for them, and—well; the closure was now applied. (Laughter.) All he would say was this: "The prospects are favourable; go ahead." In submitting the toast he would use the words with which they were so familiar at the Grocers' Hall: "Tea, long may it flourish, root and branch."

THE LEAN YEARS OF THE PAST.

Mr. Richard Magor, who responded for the growers, said he spoke on behalf of a large and varied community, represented there by shareholders in tea producing Companies and those who controlled them. In the old days shareholders as a rule were the pioneers who originally opened out the estates and continued to hold an interest in their property. Nowadays the British public had a considerable interest in tea, so the shareholders' list had widened considerably and included many who, he fancied, had but an imperfect knowledge of the men on the spot who earned them their dividends. He referred to their friends the tea planters—(hear, hear)—who, they regretted, were not represented there that night owing to that dinner always being held in the winter, after the leave season was over. Growers were now earning a fair return, which was some recompense for the lean years of the comparatively recent past. On the last occasion, for instance, that he had the pleasure of visiting the tea planters of Assam, at the end of 1901, just ten years ago, he thought he was within the mark in saying that there was hardly a garden in the valley which was working to a profit. Tea was then in over-supply and common tea was down to 4d. The next two or three seasons were also lean years, as in addition to low prices growers had to contend with an overwhelming duty. In those days tea planting was farming under difficulties and there was

A GREAT TEMPTATION TO SKIMP THINGS

in order to try to eke out the profit. Fortunately for growers to-day a very different policy was pursued, it being recognised that it was necessary to work for the future rather than for the present. even if it meant forgoing profits, with the result that a liberal scale of outlay on the upkeep of the estates and improvements in buildings and machinery was generally gone in for, so that when conditions improved they were in a position to give increased yields and teas of good quality, and so ensure the buyer gettting good value for his money. It was easy to look back to-day with a certain amount of satisfaction, but it must be remembered that while it was comparatively easy to frame a liberal policy there was considerable difficulty in carrying it out, especially in these days, when labour had to be handled with more tact and care than was necessary in the past. Shareholders to-day, therefore, owed a considerable debt of gratitude to the planters, who had assisted in bringing them to their present position. It was a great pleasure to both sellers and buyers to meet there that night at the hospitable board, although in their everyday life their interests were diametrically opposed. Fortunately there was between them in their business a sort of air cushion, a man whose stock-in-trade might well be described as *suaviter in modo*. (Laughter.) He meant, of course, their friend the broker, and it was indeed a source of great pleasure to them to see

THE DOYEN OF THE TEA BROKERS

in the chair there that night. It was often said that these dinners should be run by the young men, but he thought they were all agreed that it was the older men, who had seen the present generation grow up, that really made these gatherings a success, and they were all pleased to see so many there that night.—Mr. A. Ibbetson, who also responded, said he was delighted to see the various sections of the trade meeting together in that way, and drinking each other's health. It occurred to him that when so much goodwill was evident they ought to be able to work more together for the benefit of the trade and themselves. Would that it were possible to call a truce and end to a degree the present-day policy of cutting prices—and each other's throats. He well knew that the cry was for cheapness, but surely something more could be done to elevate the standard of the tea-drinking public. He would like to see the public educated so that they would want something better than the cheapest. They, as wholesalers, had many difficulties to contend with, and the merchants could help them to remove these difficulties. Buyers had, for instance, to sit in a room they could hardly breathe in, and on bare boards about for inches wide, and this made it very trying and difficult for them at the auctions. Then, again, there was the fact that they had to taste

A GREAT NUMBER OF SAMPLES OF TEA,

and there were no fewer than 1,600 samples of Indian tea to be tasted next week. There were, he considered, too many breaks, and merchants should bulk their teas more than they did at present. He asked that something should be done not only in regard to the sanitary arrangements of the auction room, but also in the way he had suggested about the samples. He sincerely hoped that they would often meet in that social way.—Mr. C. C. McLeod, in proposing the health of the chairman, said that Mr. Thompson held strong views about the continuation of those dinners, because he believed that the dinners would do a great deal of good. He (the speaker) believed that, as a result of the gatherings, when any dispute cropped up in the trade it would be more easily settled than was formerly the case. He was one of the members of the Indian Tea Association who was deputed to meet other sections of the trade about the pound draft dispute: but all he would say about it was that if such a dispute came up now the settlement would take about half-an-hour instead of some twenty-one weeks. (Hear, hear.) Their chairman was well known to them as one of the oldest and most respected members of the trade, and by his interest in the trade had given a great fillip to those dinners which had now been held for five years. They expressed to him their grateful thanks for having so ably presided on that occasion.—Mr. Thompson briefly responded—In response to a request for a speech, Mr. W. H. Wilby said it was a great pleasure to him to be present on that occasion. They in the China trade, he said, had got along fairly well, and they were not dead yet. They had worked hard and had seen the trade expand, and they, with the other countries, would continue to do their best to produce good tea.

The Present Position of Tea.

The *Grocer* of December 9, 1911, writes under the above heading:—

Although the tea market has recently shown signs of weakness after a period of exceptional strength and dearness of the lower grades, the undertone remains firm, and it is doubtful whether prices can give way unless the unexpected happens. . . . Present prospects are for larger supplies from Ceylon which may tend to relieve the present stringency somewhat. China tea has already been freely dealt in by the trade, and future supplies will be difficult to obtain. Both imports and deliveries of China tea show very satisfactory extension. As regards prospects of the lower grades, these remain an uncertain quantity and can only be determined by supply and demand.

COFFEE.

The Advertising of Coffee.

At the first annual Convention of the National Coffee Roasters Traffic and Pure Food Association held at Chicago on November 16 and 17, 1911, Mr. J. H. Henrici delivered an address on "Coffee Publicity." Although this was intended to deal with the subject from the standpoint of coffee-roasters it contains much that should interest coffee-planters. Whatever is done to promote the retail sale of coffee is intended to stimulate consumption, and it is scarcely necessary to add that producer, wholesale dealer and retailer ought to co-operate in work of this kind.

Mr. Henrici said :—

The Chicago members of this association are very anxious to have it known that one of the main objects of the association would be to benefit and promote the interests of the coffee retailers. We surely have no desire to antagonize the retailer. We want him with us; we want him and the public to know it, and we want them thoroughly to understand that our association is in no sense a trust. We must have this fact clearly understood by importer, roaster, retailer and consumer. We must not be misunderstood by the public; we must make it very plain that our association has neither intent nor desire to evade or break any law. We must conduct our affairs in such a manner as to challenge the closest scrutiny and investigation.

As I understand it, publicity also means notoriety. What we want to avoid is to become publicly notorious.

I am sure that some member or members to-day present, can tell us just how we ought to promote the interests of the retailer, and that we shall have this valuable information later under good of the association or some other order of business. Merchants engaged in the coffee business have sadly neglected their own wares, they have permitted shrewd, sharp advertisers to create a belief among hundreds of thousands of individuals that coffee is injurious to health, and that the only remedy or relief lies in drinking or eating dopes or substitutes which these smart gentlemen manufacture and distribute at great profit to themselves.

I am told that the sales of one such concern amount to $5,000,000 annually, with a net profit of about $1,250,000. The sale of such fake stuff with its alluring and misleading advertisements has now assumed such proportions that all the advertising of only one coffee firm would not have the slightest effect. There are, however, already on the market booklets which place coffee in its proper and true light, which explain why coffee is healthful and beneficial, and explain it in such a manner that anybody who can read can understand. Such booklets, if distributed by members of this association in their daily mail, will produce much good. If the association, as a body, through a committee and the members individually, would use explanatory literature, newspapers and magazines to advertise the good and healthy qualities of coffee in a dignified way, many people now consuming slops would hesitate and investigate, and before long they would spend their money where they could get some value for it.

I think I am correct when I say no one firm in the coffee roasting business has a definite policy to fight the cereal substitute evil. It has grown so here in Chicago that some of the coffee wagon men are peddling a well-known brand with their other wares. We seem to have been lacking in enterprise and energy. Let's turn over a new leaf and give to coffee the place that it should occupy.

Many physicians tell their patients to stop drinking coffee. I presume they do this because it is the easiest way to diagnose. This association should conduct a general campaign of education with and among the medical fraternity. Let these gentlemen for a while put the blame on cream or milk or sugar if they must have something to blame, but let them leave coffee alone unless they prescribe it as a healthy beverage.

I have been told that the Brazilian Government is spending some of its hard-earned valorization money in England to popularize coffee. This is a good scheme, and this association is large enough and strong enough to request an appropriation for the United States. Let us make a demand for some money, and spend it to boost coffee and to fight the substitute game.

Let us have small coffee articles in the newspapers and magazines, on fences and walls from the Atlantic to the Pacific, and from the Gulf of Mexico to Canada; every one of these articles to be a message announcing in advertising to the entire reading public the good and beneficent qualities of coffee. Publicity and wide publicity of coffee is in my estimation, the only remedy with which to overcome the competition of fake merchandise.

Market reports and quotations in the daily papers should be furnished to the papers only by a publicity committee of the association, so that these quotations and reports will be always uniform and correct. To-day there is so much falseness in the articles that much confusion and dissatisfaction result.

Another form of very important publicity. but of an entirely different nature, is that of publicity among members. They can and should assist each other by full discussions of affairs pertaining to the coffee roasting industry. Let every member mentally resolve that all his fellow members are as honest as he is, and that all have the common good at heart. When a complaint is made, and there will be many, do not condemn your competitor, but go to him; tell him freely and frankly of what he is accused, give him all the data you have collected, and ask him for an explanation. The explanation should be made just as freely and openly as it is asked. The good business man will try to buy his merchandise at the closest possible price. He is to be commended for this even if he does try to lead the seller untruthfully. For instance, he shows a salesman an invoice which supposedly proves his plan that some other house is making a closer price than he is prompted to offer. Your own salesman is, after all, your hardest competitor. He is really only a purchasing agent for the customer, and he argues with you to reduce your price and profit. He does not seem to care whether his house is making or losing money; he is so thoroughly interested in making a sale that everything else is of no consequence to him. His idea seems to be that Providence will take care of the profit account if only he produces the volume of sales. Let the salesman know that his house has an intimate acquaintance with its competitors, that there is a system of publicity among and between them, that the bill which was presented to him did not explain the entire history of the sale. Procure for him the evidence necessary to convince him, and you will make of him a more fearless, a more loyal and a more profitable salesman. This can be done and should be done by publicity among members. The matter of credit is another feature that can be regulated by publicity among members.

A salesman often tells you that so-and-so told him he had a line of such-and-such an amount, with some certain house, that this certain house allowed him 30 days, less 2 per cent., or 90 days, net, or some other extravagant benefits, which are out of the ordinary and out of all reason. Such reports will be found false nine times out of ten if investigated. Here again we must hold up the arms of the salesman by convincing him that his customer was in error when he made the statement. When your salesman finally learns and discovers that you can and will disprove all his irregular sales, he will finally have confidence in what you tell him, his whole attitude will change, his sympathies will be with you, he will fight your battle and become a producer instead of a destroyer. This again can only be brought about by wide publicity among members.

This concludes my remarks on the subject of "Publicity." Mr. Atha, who was to entertain you with this subject is chuck full of it. I will ask him to write his thoughts and send a copy to every member. Perhaps by reading his remarks and remembering something of what I have said, you may get some idea of what publicity really means.

Santos Coffee Speculation.

The recent boom in coffee has led to wild speculation in Santos, and the October settlement has placed several firms in difficulties. The movement of prices in October has been exceedingly heavy, type No. 4, for instance, having advanced from Rs.8$000 almost without a break, to Rs.9$900, at which rate business was done for December. Proper margins had not been called up by the two Clearing House concerns, and as a result one large firm of native dealers liquidated their shortage for October paying a composition of 50 per cent. only. The Clearing Houses are now, of course, calling for full margins, and the registration of any new business requires a deposit of Rs.4: 800$000 (£320) per 1,000 bags at the Registration Company, and of Rs.4: 000$000 at the Intermediara Company. This will naturally tend to curtail term operations and release the actual coffee, thus making the position of the buying combinations a difficult one to sustain. The Government of the State of Sao Paulo is not at all pleased with the reckless speculation which has been going on in Santos, and the difficulties encountered over the last settlement have accentuated the bad impression produced in official circles. A project has been in existence since 1906 authorising the creation of an official coffee exchange in Santos and in Sao Paulo, by means of which the State Government could keep a better control over trading methods. This project has now been brought up to date, and advantage has been taken of the present opportunity to present it to Congress for approval. When the original scheme was introduced it was much criticised, but the revised version includes certain concessions requested by traders some years ago, such as the reduction of the guarantee payable by each coffee broker from 20 to 10 contos, and the maintenance of the excellent brokerage of 150 reis per bag of coffee negotiated. The provisions also include the creation of a coffee exchange in Santos only. The general dispositions are in the direction of regulating the speculation in futures as much as possible for the benefit of the trade in general, and as such they are commendable, and worthy of support.—*Economist*.

The Hamburg Market.

Writing on December 6, 1911, the Hamburg correspondent of the *Economist* said :—

The generally less favourable view taken of the position has been accentuated by the monthly statistics, which show an increase, according to the Havre official statistics, of 338,000 bags to 13,456,000 bags. A year ago there was a decrease in supplies of 77,000 bags to 14,740,000. . . . The coffee disposed of has passed into the same strong hands that have accumulated both futures and the actual article for months past. Whether the break in prices at Santos be only a manœuvre or genuine unloading remains to be seen, but it may be useful to put on record that the former opinion is expressed in quarters supposed to be in the best possible position to form a judgment. It is therefore, probable that a determined upward twist may follow this week's fall, no matter how unfavourable statistics may shape themselves, and it would be imprudent to act on the impression that the beginning of the end had come into sight in coffee manipulation.

SELECTED CUTTINGS.

West African Planting.

ITS POSSIBILITIES AND FAILURES.

MR. H. OSMAN NEWLAND, Honorary Secretary, British West African Association, has contributed the following papers to the *Rubber World*:—

I.—PRELIMINARY.

West Africa is a land of romance, mystery, and imagination. Vast riches lie buried deep beneath the green-splashed yellow coastline and in the heart of its damp impenetrable forests, riches which cannot be picked up in a moment by the unskilled, but surely await the diligence, patience, grit, and scientific enterprise of the planter and the engineer assisted by capital. But much remains to be done before the prejudice and ignorance which have retarded West Africa's progress in the past are swept away, and only the hearty co-operation and combination of the best of those who have interests in West Africa can succeed in attracting capital to its shores and in securing that such capital shall be used wisely and only by competent hands.

For West African planting, as well as mining, has suffered more from ignorance and unscrupulousness than from insalubrity or fever. When once a man has the call of the bush in his blood he will continue to answer it until, perhaps, he leaves his bones there. But capital is more easily scared; and several organs of the Press have assisted to frighten investors in West African enterprises, sometimes through deliberate omission of facts, sometimes through sheer ignorance even of West African geography. . . .

Plantation work by Europeans in West Africa is of later date, perhaps, than in any of our colonies, and there are still those who disbelieve in it, insisting that the West African native worker must do better for himself than for anyone else—as if this were not true of most people—and that European plantations, as such can never succeed as in the Middle East and the West Indies. This may be true of the palm oil plantations, although even in this case the causes are probably to be found in the primitive methods of cracking the nuts, which still persist, in the want of transport into the interior, in the existence of monopolies in trading, and in the propaganda of the Aborigines' Protection Society, which supports this state of things and is anxious to discourage the transfer of land from the native to the European planter—but it certainly is not true with regard to rubber plantations. Labour in those parts of West Africa where rubber plantations are any good as quite as available and as good and cheap as anywhere in the Middle East. The greatest difficulties in the way of Coast plantations are due neither to labour nor to soil, but, as I shall presently show, to causes which make it imperative for the planters and directors of plantation companies, equally with the shareholder and the trader, to combine in an association to protect their interests and redeem the failures of the past.

II.—RUBBER FAILURES.

The principal plantations of West Africa are devoted to cocoa, rubber, palm kernels, cocoanuts, kola, cotton, wild rubber and mahogany from valuable forest adjuncts while palm oil trees are abundant in their wild state, shedding their valuable nuts to waste in the bush because there are few to exploit their wealth. The purely forest products are best left in the hands of trading Companies with large capital. Both good plantations of rubber, cocoa, kola, cotton and cocoanut should presently yield handsome returns. The Government experiments both with Hevea and Ceará have been satisfactory. In a Sierra Leone plantation over 80 per cent. of Hevea stumps brought from Ceylon have successfully germinated. Why, then, the recent rubber fiascos in West, Africa? Without exception, I believe these have been due to questions of title, unscrupulous promotions and over-capitalisation, want of transport facilities, and incompetent managership. To take the first, several plantation companies have suffered by having managers who knew nothing about rubber. In interrogating a manager of one such company who had reported on their property before he went out, and whose services were afterwards, at my suggestion, dispensed with, I was amazed to hear that the excuse for his inaccuracy was that "the leaves were off the trees" when he saw the estate and therefore he could not detect Manihot (Ceará) from Hevea whereas anyone who knows anything at all about rubber could at once detect the Manihot by its bark alone. Another Company (in the Gold Coast Colony) recently brought to my knowledge had a manager who was working an absolutely valueless plantation but who did not know it till an assistant manager who had had considerable planting experience, arrived on the scene. Another Gold Coast estate still employs an engineer as manager, while two others employ traders. The last annual report for Sierra Leone concludes with this most significant paragraph: "It cannot be too strongly impressed upon capitalists and Companies starting new ventures in a country like this that it is absolutely necessary to send out men who thoroughly know their business, as probably more promising schemes have been wrecked through incapacity than by any other cause." Unfortunately capitalists do not read their reports. Secretaries of Companies rarely procure them. Managers and assistants have been appointed either "to eat their own words" having made the original reports on the estate, or because they are relatives or friends of directors or promoters who are ignorant of West Africa, its conditions and needs. Like many a mining engineer these servants have gone out on a comfortable salary for twelve months' service and "bossed the show" till overdoses of whiskey or the passion of some questionable concession send them to hospital or home. The existence of an association which keeps records of West African planters and traders as well as of concessions, laws and names of chiefs, survey maps, etc., should put an end to this kind of thing, and it would be well if all West African Companies consulted the association before appointing any manager or assistant or taking up a concession.

This brings me to a second and third cause of plantation failures—questions of title and unscrupulous promotions.

Inability to obtain title deeds has chiefly occurred in the Ivory Coast and in German and Portuguese territory. Portuguese concessions are the most unsatisfactory of any. German laws demand that the land must be held in the name of an individual. The failure of the Ivory Coast estates sufficiently illustrates the dangers of French plantations.

But on the Gold Coast questions of title arise so frequently and are varied enough in character to occupy the whole book. Briefly, they consist chiefly in (*a*) securing a concession, part or all of which has been conceded by a previous chief, (*b*) securing only the local chief's consent without that of the paramount chief, (c) lack of survey orders and certificates. In one or two West African protectorates also the special tribal authorities over land from a cause for questionble titles.

As to over-capitanlisation and unscrupulous promotion, these difficulties may perhaps be overcome by efficient managership, sound title and finance and good transport. Transport difficulty has a cause of many a failure, not only in West African plantations in the Gold Coast Colony, miles away from the Railway, the Coast or any river which is more than a stream all the year round. Such plantations can never pay well, if at all.

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The First Assistant Scientific Officer.

It is a pleasure to place on record the fact that Mr. G. N. Frattini has been offered, and has accepted, by cablegram the first appointment of Assistant Scientific Officer to the U.P.A.S.I. Arrangements are being made for him to arrive in Bangalore very early in May next, and he will then be deputed to reside and work in Mysore State in accordance with the scheme settled with the North Mysore, South Mysore and Bababudin Planters' Association.

A few words about the coming addition to the Scientific Department of the Association will probably be of interest to the whole community of planters in Southern India.

Educated at St. Augustine's School and later in Hanover, Mr. Frattini is conversant with both German and French—a great advantage to a scientist, since the records of much valuable research work in Science and Agriculture are published in those languages.

From 1905 to 1908 Mr. Frattini was trained in the same London laboratory in which the Scientific Officer worked for some time before he went to the West Indies. Here Mr. Frattini learned the practical side of analytical chemistry and also studied bacteriological work. His knowledge of the latter presages well for the planters in Southern India, for as Mr. Hutchinson, the Bacteriologist attached to the Pusa Staff, wrote recently, "Chemical analysis has told us much as to the plant foods present or wanting in soils and has suggested the use of artificial and other manures in the field; mechanical analysis has shown the necessity for taking into consideration the texture of the soil as a prime factor in producing fertility; but neither of these methods can provide full information as to the multitudinous and complex changes going on in the soil, the sum of which results in the production of available plant food. The importance of the biological factor has been more fully realised in recent years." There can be no doubt that the bacteria in the soil are a most important factor in the growth and health of the plant and modern scientific agriculture calls on the up-to-date planter to grapple with the problem of controlling them and using them for his gain.

At the end of 1908 Mr. Frattini was appointed Chemist to the Stellite Explosive Co., Ltd., in Wales, and he is giving up this appointment combined with that of Assistant Manager to come to India. In this position he has had considerable experience of handling labour and he has carried several researches of an original nature to a successful issue.

He writes:—"Although I have an Italian name, I was born an Englishman." Twenty-four years of age, six feet one in height, planters will be glad to hear that their future senior Assistant Scientific Officer is likely to prove not only a great aid to them on the estates, but also a social acquisition, for he is a good musician and an athlete of no mean order, his speciality being tennis.

He comes out highly recommended, and he will doubtless meet with the welcome that is given to all good fellows who work hard and play hard in India.

Scientific Assistant for Coorg.

Inquiries are now being made with the object of securing the services of a second Scientific Assistant Officer, for employment in Coorg; and it is hoped that there will be little delay in carrying the matter through.

Experiment Plots.

It will have been noticed that recent numbers of the *Chronicle* have contained an account of results obtained, or progress reports, on experiments being conducted on the Experiment Plots in various districts which were established in accordance with the scheme outlined at the Annual Meeting in 1910.

A few reports not yet published have been received, and matters of general interest contained in them will be published in the pages of the *Chronicle* as soon as they can be written up. A reference to the list of experiments published on p. 534 of Volume VI, however, will show that there are many more which have not yet been reported upon, and the Scientific Officer hopes that all those who are conducting such experiments will let him have a record of any results already obtained, or at least an account of the progress made, at their early convenience. not necessarily for publication, but in order that he may know how matters stand.

With the advent of two Assistant Scientific Officers it is desirable that these reports should be brought up to date, especially in the districts of Mysore and Coorg, since by no means the least important part of their work will be the superintendence of Experiment Plots. It is hoped, and intended that the Assistants should elaborate this part of the work of the Scientific Department, for it is only by properly conducted experiments on a scientific basis that the majority of the problems which confront planters can be solved.

Roads and Communications.

With reference to resolutions passed at the last annual meeting of the U.P.A.S.I. the President of the Madura District Board writes:—

"The terms of the agreement entered into with the South Indian Railway have not yet been communicated to this office. The matter is pending before the Government."

Coffea robusta Seed.

After all, it has been found possible to procure a small additional supply of this season's seed, and a shipment is now on the way. The greater part will be needed for the execution of orders already received, but there will be a few pounds over, and the Secretary will be glad to hear from planters who wish to purchase.

THE PLANTER'S LIBRARY.

"The Cultivation and Preparation of Para Rubber."

The second edition of W. H. Johnson's book on "The Cultivation and Preparation of Pará Rubber" is much enlarged and is said in the preface to "include all the latest authentic information, and to cover a far larger range of subjects likely to be of interest or utility to those in any way connected with the rubber industry."

It is remarkable how errors are persistently copied from one book into another. Two old stagers appear in almost every Rubber Text Book of this type, the recommendation to thumb nail prune, and to grow Cacao as a catch crop among Hevea Rubber. The author has not been able to avoid repeating these, but he also reproduces another mistake which has not appeared recently, *viz.*, the recommendation to grow *Mimosa pudica*, the *Sensitive Plant*, as a green dressing.

With the exception of these few blunders the book is a very useful one of its kind and should find a place on the library shelves of the up-to-date Rubber planter. The description of the different kinds of tapping knives and the various types of rubber machinery will be found especially useful. The following extract taken from the section on Manuring will serve to indicate the writer's method:—

"It is of very little practical value to the rubber planter to tell him what mineral plant-food constituents are present in his soil; what it is necessary for him to know is the amount of plant-food that is available in a soluble state. These foods must be in such a condition as to be soluble in the sap of the root cells; this is only approximately equivalent to the amount of mineral constituents which a 1 per cent. solution of citric acid is capable of rendering soluble and not that rendered soluble by strong mineral acids.

"The study of what may be termed the biological condition of soil is of primary importance in modern scientific agriculture, and it is one with which the up-to-date planter must sooner or later be called upon to grapple. The amount of available plant food in the soil is very largely influenced by the number of nitrifying bacteria present. The nitrogenous compounds of organic matter which are present in most soils, are under favourable conditions, acted upon by bacteria which secrete a peptonising ferment and change them into ammonia, and ultimately to nitrates, in which condition they form a soluble plant food. The essential requirements for the life and multiplication of soil bacteria are air, moisture, and heat. Sour, water-logged land is always imperfectly aerated, indeed this is the only condition which excludes air from the soil. Rain water is an important factor in soil aeration, for as it sinks into the ground it displaces an equal volume of air, and as the water drains away air is drawn in after it. In undrained land air is displaced very slowly, and consequently the beneficial effects of rain water are lost. Although it has not yet been decided whether roots like leaves, breathe, still the fact remains that air is as necessary to roots as it is to leaves. In employing drained swamps or water-logged land for a plantation, a simple method, and one which may be generally relied on for testing whether the soil is sour, is to take samples of moist soil from different portions of the suspected region. Mix them all together add sufficient water to enable them to be stirred into a paste and insert a piece of blue litmus paper. If after an hour has elapsed the paper in contact with the soil turns red, the soil is probably sour. To neutralise the acidity, broad-cast water-slaked lime at the rate of about 2,000 lbs. per acre. Stone-lime may be expeditiously slaked by covering it with moist soil until it is converted into powder, when it is ready for use. Applications of lime also materially assist the work of nitrification bacteria."

CORRESPONDENCE.

Labour Problems.

Dear Sir,— Mr. Martin's letter of 24th ultimo opens up to me quite a new line. ...

I thought, and have so thought for many years, we had an idea of combination and keeping coolies pay at one figure. But I now gather "each owner, each Superintendent, must consider if his own conditions offer sufficient attractions to Labour. If not, he must see that they do." etc. etc.

I am situated 20 miles from Bazaar and other cooly conveniences, but I try and pay as others more favourably situated. Does Mr. Martin intend that in "offering sufficient attraction," which I wish to, I am to advertise, and carry out my offers such as Omnibus to meet all trains, Pucka Lines and well aired Beds, Toddy free, Rice at nominal prices—and so on.

In Mysore with many native planters, who come out to their properties either only to pick or to weed and pick; they do not mind raising rates all round for 15 days or a month, and that *of course* upsets the labour. If one Estate begins offering what it believes to be long felt wants, there will be no end to it. My next neighbour is paying 4 as. a woman *this* week.

On the other hand so far as Mysore goes the Law (Act XIII) as administered *only* brings trouble *to the Planter.*

Yours faithfully,

H. W. RAIKES.

A REMARKABLE FLOW OF LATEX IN BOSTON.

The Chinese rubber tree, in the Arnold Arboretum, in Jamaica Plain, a suburb of Boston, has excited considerable comment, but the discussion to which it has given rise does not compare with that occasioned by the extraordinary rubber tree which was displayed in the Hood rubber exhibit at the Educational and Industrial Exposition recently held in that city.

Hitherto it has been considered necessary to take a trip of at least 2,500 miles down to Pará and up the Amazon in order to see the *Hevea brasiliensis* giving forth its valuable contents, but here was a specimen of *Hevea* right in the heart of Boston, giving out a fine, full, free flow of latex several times a day.

The tree was visited by a large number of people. A painstaking mathematician, after some very careful calculations, concluded that, at the rate of this daily flow the tree ought to produce about two tons of the finest Pará annually. The tapping was done by the familiar half herringbone system and the advocates of this system found very much to corroborate them in their belief in the generous results attained in this particular instance.

This remarkable rubber tree was particularly interesting to the botanist, for while in many of its aspects it appeared to belong to the *Hevea brasiliensis* family, there were some marked differences. It was finally determined that it was an entirely new species, namely, the *Hoodensis Elastica.—India Rubber World.*

[An illustration shows a small section of the tree—from the ground to a distance of five or six feet—which is said to give a fair conception of its appearance, but to convey very little idea of the great amount of attention it received.]

COFFEE.

Valorization, &c.

At the banquet held in connection with the American Coffee Roasters' Convention at Chicago, Ill., on November 17, 1911, the toastmaster of the evening called upon Mr. Hermann Sielcken for an address.

Mr. Hermann Sielcken, of Messrs. Crossmann and Sielcken, New York, said:—

Mr. President and Gentlemen: I hope I will not disappoint you in what I may say to you. I was invited some time ago to give a lecture in Harvard University, where I gave a lecture once before, but this time they asked me to speak on coffee. I was in Europe at the time and I was not well, but I wrote that I came too near to the subject and I didn't care to speak of it, and unless they understood the subject I probably would not be well understood. But here, as you are all in the profession, you will know at once whether I am right or wrong, and if you don't understand any remarks I make don't hesitate to interrupt me. I have no notes to speak from; I don't need any—it is a very familiar subject to me. Therefore, if any remarks I make you do not quite understand please interrupt me.

I want to speak to you first about the valorization, as I was as close to its birth as anybody well could be, and I will tell you the origin of it. The origin was entirely in Brazil. A single firm in Brazil closed out mortgages on 27 plantations, one firm, and many others would have followed, and the Government became afraid that the land would go into foreign hands. Already many large corporations had formed and bought coffee plantations. The price which ruled after 1903 was too low, the Brazil planters could not exist. They had two very difficult matters to compete with at the same time, for exchange was low when the basis was selling between 6 pence and 12 pence, their labour was relatively so much higher that when the exchange went back to 18 pence their labour increased in price and the value of their coffee decreased. During the very prosperous years from, we will say, 1900 to 1906—the most prosperous years the planters have ever seen—they entirely gave up planting corn, rice, beans, and everything they needed they bought, because coffee was so immensely profitable; they put all the labour in coffee. While the price of coffee was very low the Government of Sao Paulo tried to force the planters to raise their own necessities by putting a tax on new plantations. It must not be understood that a planter could not replace old trees on his plantation, but he could not put new trees into the plantation without paying a tax, so much per tree. This was done simply to force the planters to employ their labour in raising their own necessities. They then believed it would be possible to raise coffee at the prevailing prices for a living, but in 1903 to 1905 and 1906 times became harder and harder, and as a friend of mine who closed out several plantation mortgages said: "I will never do it again. My life is worth more to me than that."

You will well understand when a man loses his homestead or plantation, not because he has been a spendthrift, not because he has paid too little attention to his work, but because he has paid too much attention to his coffee, it comes hard. The little State of Sao Paulo, with its 100,000 people, raised larger crops than all the rest of the States put together. That means industry in the highest degree. Now, if those men who had worked hard to raise their crops should lose their homesteads because of the prices at which they could sell them, so that there was not enough to pay interest and other expenses, they naturally became desperate, and from desperation it is but one step to revolution. In all South American countries, either when the crops fail or when the planters are hard up, that is the only time they have a revolution. The Government of Sao Paulo knew that, and, therefore, they tried to raise money bv the coffee and held it for the planters at such a price they supposed would be necessary to continue the industry. They could not get the money from any bank or bankers in Europe. They tried Rothschilds first, who had been bankers in Brazil for 60 years, and they were flatly and at once refused, and after the Rothschilds refused every banker in the country refused.

This was in 1906. In August, 1906, a commissioner of the Government came to my place in Baden-Baden and proposed the business to me. He said to me he had been all around, and he spoke of very large amounts. I told him until I knew what the next crop would be it would be impossible for me to take a hand in it. "If you raise another crop like this," I said "there is no financial assistance coming from anywhere." Well, he told me the next crop would be good, and he told me a very interesting story, and I said I would have to have that from somebody who was not interested, unbiased. Well, we were told by the people that the next crop following 1906 and 1907, would only be a third in size, and it turned out so. I said finally: "What do you want from us?" "Well, we want you to finance for us five to eight million bags of coffee." I told him: No, there was not the slightest chance for it, not the slightest. At a price low enough, I might be able to raise funds to pay 80 per cent. on the value of 7 cents a pound; not more than 7 cents a pound, because he told me at a higher price than that they could live.

The general impression often has been that valorization had sought to put up the prices, which is not true. It was not done with that idea. I myself made the contract that we were to advance 80 per cent. on the value of 7 cents for No. 5 coffee. If the price was higher we would not take anything, because there was no necessity for it. At a higher price than that the planters could live. At a lower price they declared they could not.

Now, the Government was in trouble about it. They had promised the planters four million bags as a minimum, and we told them 7 cents as a maximum. That if the market was lower, then 80 per cent. of that lower value. If the market declined to 6 cents we would advance only 80 per cent. on that 6 cents. Well, as they could not get any better conditions anywhere else, they finally made this contract, with the condition that about a third would go to New York and two-thirds to Europe to be divided into different markets. I made the condition that the Government should not buy from the first of October to the first of February in excess of 500,000 bags a month. You know that is the principal crop season for the territory, and the minimum was 3,000,000 bags. I knew that if they had a chance they would buy the 2,000,000 any way right away. The natural inclination of Brazilians would be to stem the tide, and the condition was 500.000 bags a month for four months. and it was kept up. The price, of course, declined, because 500,000 bags was not enough for the requirements.

The Toastmaster—Excuse me. Did you say 500,000 bags a month?

Mr. Sielcken—Five hundred thousand bags a month. That was the condition of the first contract made. I also knew at that time that 2,000,000 bags of coffee would not cover the deal. But if the Brazilians had known from the beginning that they could finance six or eight million bags, we could not have held them. And I told the merchants and financiers who went in with me: "We are going to finance it downwards." I could not tell them all so because the Brazilians would have stoned me. But I did say: "Finance it downwards." So we did. Because the last consignment from Brazil at that time marketed up to the basis of 5 cents a pound. On that we advanced 80 per cent. The markets from the time the deal was commenced almost immediately declined and kept on declining. But any impression you may have formed that it was made for the purpose of advancing the price, or in any way establishing a basis simply by the power of money, is not correct.

When the first 2,000,000 bags were bought they came and said: " Well, now, how about the rest ?" The total amount was 8,000,000 bags, and there was far more trouble to get people to advance on 6 cents a pound, on 5, than there was on 7 cents. Everyone who went in on 7 cents a pound thought: Well, it will go up and my figures will be safe. I told them: " Well, gentlemen, an advance at 6 cents a pound is safer than 7 or 8." They said: Well, if it goes to 4 it may be cut to 3." And it was shown so clear that the crop was so big it could not be helped. But from the beginning the business was done on the downward basis. And all that coffee that was shipped had been shipped on the condition that the Sao Paulo Government was obliged to make good any deficiency there was at Sao Paulo, and when the market went down to 2 cents, the Government had to pay it just the same as any other individual and save the difference by cable until the whole deal was finished.

But the question of capital had nothing to do with it; that is, capital outside the trade had nothing to do with it. The whole business that was done was by the coffee merchants: and out of the total of 8,000,000 bags 6,000,000 went to Europe and the balance came here, and all of it was done by the coffee merchants in New York, Havre, Hamburg, Rotterdam, Antwerp, Genoa and Marseilles. After the deal was completed and the crop year was up we tried to sell some, but the first sales met with universal condemnation. We had auction sales in New York and they combined not to buy, and the sales I made in New York at that time, I think I sold the choice of coffee from 8½ to 8 cents, the best coffee we had. That was not very easy. Until some very large dealers came into it to buy and some old ones they all declined to buy.

Everybody, even the press, had been inimical from the very beginning, and, as you know, has remained inimical up to to-day. The Brazilian Government and the Federal Government indorsed the action of the Sao Paulo Government, and the two other coffee-raising States in Brazil—Minaes Geraes, and Rio de Janeiro—also joined Sao Paulo Government from the very beginning; but the State of Sao Paulo had to carry the burden of it all through taxation, and several times it looked very black and it did not seem possible to raise the loan.

Of course, merchants like myself, and all the others who were in it, we didn't wish to carry that coffee for ever. It was our own capital. It was supposed from the beginning that after a year or two we would be relieved. Well, it took two years before the loan took place.

Now, the house of Rothschilds had been the strongest enemy we had in the beginning, because the situation had been entirely misrepresented to them; they had never understood the business. But after they fully understood that valorization was never done on any unsound basis, that we never tried to put up the market, that we simply advanced on the markets existing in the world 80 per cent., they changed their minds, and their change of mind made that loan possible. Without their change of mind it would have been very difficult.

So in 1908, in December, we made the loan of fifteen millions sterling—$75,000,000—of which the United States only took ten millions out of the seventy-five, or less than one-seventh. Of that amount the contribution in New York was about one-fourth; but the amount of the loan that went to this country was only one-seventh of the total. Now, I ask you what would have been a better way for the United States to do? We desire a large export trade in South America. I myself am a large exporter to South America, probably averaging as much as anyone in this country. During the twenty-five years of continued effort we have been shippers of almost everything manufactured in this country for the Brazilian market, the Argentina market and all other South American markets. We are all the time telling them "we are Pan-American; we had a Pan-American Congress. We wish to do business with you. We have a congress in Rio de Janeiro, at Buenos Ayres, at Mexico and Washington. We want to do business with you." . . . .

As far as conditions for selling are concerned, the conditions for selling they made when the bankers contracted for the loan—those conditions had to take care of both parties, the planter as well as the banker, and the one to take the loan. The planter paid all the expenses. A surtax of 5 francs was demanded by the planters, because the coffee as a simple security would have eaten itself up by cartage, insurance, storage and all those expenses that would soon make the original security a very poor one. Nobody in those days dreamed that coffee would go up as it has done; nobody thought of it.

The conditions were that the first year 500,000 bags should be sold and the next year 600,000 bags should be sold and the next year 700,000 bags. and that the committee in charge of the selling should have authority in case the market is high enough to sell double the quantity, provided the trade would take it. I myself am a member of the committee, and we sold last year double quantity; 600,000 was the amount allowed for the year and we sold 1,200,000 instead of 600,000.

In the beginning, the French, who took five million sterling of their own, put in a condition that not more than 10,000,000 bags should be exported as long as the loan was in existence. They never dreamed that we would have crops which would not be large enough to export 10,000,000 bags. It was not supposed that would be the case. Everybody was looking for a possible continuation of large crops through the days of the loan. On the other hand, the planters said: "I will pay you 5 francs a bag from the beginning to pay all the expenses. If we get a small crop and you take away my market by simply selling what I have got I cannot pay the 5 francs; I cannot pay an extra tax. You must not rob me of the markets, of course, in case I have a small crop." And of course, nobody will sell a small crop on the same price as a large crop, which all of us understand. Therefore, the conditions for selling were not a manipulation of the market afterwards or before; they were made in proportion to what we supposed would be sold in addition to the regular crop growing every year.

In regard to the sales, up to the present we always found an unfriendly market. Whenever we wanted to sell in all the markets of Europe and our own immediate opposition was raised and bear sales were made to make us sell the coffee cheap. I am a member of the committee and if a product is entrusted to my care I naturally try to sell it as well as I can, and not as low as I can. Nor was that the purpose of the deal. As you understand, the merchants advanced the money on the coffee and the bankers afterwards took the loan from us. They never advanced the money to buy the coffee—we did, the merchants. I suppose there were forty of us; in the beginning only four or five; but as the necessity became larger and larger and the quantities a great deal more, more merchants all over France, Germany, Belgium and everywhere helped to take care of the loan. Since the loan has been in force no bank or banker in this country has ever advanced a dollar on the coffee. . . .

I don't know just exactly what is meant by a coffee trust, or by bulling, or manipulating the market among the bankers. I can speak for my own firm and myself. We sold last year all the coffee which we had in stock for years. We didn't know last year in the months of July and August that the crop would turn out so small. We had no idea of it, because in July, August, September and October a heavy advance took place and we had sold three-fourths of our stock. We had no more idea that the crop would turn out so poor and advance the market than any of you might have had at the same time. Certainly, if we had known we didn't act like it. In this year we sold in excess of 3,000,000 bags green coffee, not manufactured. Last year we sold two and a half million bags. Independent of whether the market was high or low we sold so long as the people wanted it; we sold our coffee. If other people wanted our coffee we let them have it. It paid us a fair profit and I am always a believer in letting our buyers make something as well.

The charge that New York has made large amounts of money on this coffee deal is not true either. I know that as regards my own business, of course, and I know the dealings of my neighbours in New York. And if all the New York coffee merchants together, including Arbuckle and ourselves who have carried the largest stocks in declining markets and naturally had the largest stock in an advancing market—if all of us together have made $10,000,000 in two years, that is the maximum amount; and the amount of coffee that went through our hands in New York is about 5,000,000 bags annually. 10,000,000 bags at $1 a bag when the market goes up 6 or 7 cents, I think you gentlemen will not consider it excessive. . . .

Usually when you manipulate the market you buy; you don't manipulate the market by selling, and we have been steady sellers whenever the market has wanted it, and in five weeks we have not a bag in store. Not because I believe the market will go down. I believe not. But the market conditions are not depending on what we do, or what Arbuckle does or what anyone else does. The market conditions depend on the buyers. I have been a merchant in New York on my own account now for about 35 years. I have seen many deals in wheat, in corn, in cotton, in sugar, and I have not seen a single successful deal in either one of those articles unless nature favoured it, and by nature, I mean the crops. It is impossible. It has been impossible in the past, and I think it will be impossible in the future for any party, no matter how much money they have, to be capable of cornering the market successfully unless nature is favourable. You have seen times in Chicago on wheat when an attempt has been made to corner wheat and out of ten deals, probably eight failed, and the two which were successful were backed up by small crops. And small crops bring higher prices in themselves.

Now, if you take the position that the merchants should not speculate, why all of us speculate. One speculates in a smaller degree and one in a larger degree. If the United States makes a law that the merchant should not speculate he is degraded. Shoemakers and tailors are not fit to make a country great. A certain amount of courage, a certain amount of foresight, of willingness to invest is necessary, if the country is to advance. As far as I know of the conditions of the crops in Brazil this year, when we expected a crop, we expected that the present Sao Paulo crop would turn out 11,000,000 bags and the Rio crop 3,000,000 to 3,500,000 bags. Some people expected in January of this year that the Sao Paulo crop would be 12,000,000, and the Rio 3,500,000 to 4,000,000. Some people expect so to-day. The probability is to-day, from what I know of the crops, that the Sao Paulo crop will turn out from 9,000,000 to 9,500,000, and the Rio crop 2,000,000 to 2,500,000. That is altogether a crop of 12,000,000 instead of what was expected, 15,000,000 or 16,000,000. And next year, from all I know up to the present, it will be the smallest crop that we have had for many years. In Brazil, at the beginning of this year, in January, February and March, they had an excessive drought. And that is not the first year. For three or four years running they have had very little rain. In not a single year has there been enough rain to act as a fertilizer, and rain is the only fertilizer. And in Brazil without rain they cannot raise a large crop. But when it comes in the months of May, June and July, which is the usual time to pick the crop, naturally during the crop picking season and the gathering season, you require dry weather. During April, May, June and July, during that time, the grass grows very slow. And where the coffee trees are out of rains and storms come they beat off at a loss every time. The season for picking this year has been one of the most disastrous ones that we have ever had. It was raining and cold in July. In July seven days there was actual frost at night and below the freezing point, and up to the middle of October it was poor weather. . . .

Here, to-day, as far as I know, there is no house in the United States that has an excessive load, or enough for speculation. My own, Arbuckles. Some of my neighbors have a large stock, but they have a large business and they require a large stock.

The head of a house told me a few days ago:

"Mr. Sielcken, when we bought from you 100,000 bags three times within a year, each time we bought it you could buy it for one to an eighth and a quarter the same price." We have always been willing to sell from 1 to 50,000 bags from day to day whenever the trade wants it. Now, when you see in the newspapers the term trust, a coffee trust, or corner, ask what is a trust? A trust to my definition is a combination of different people in the same line of trade under one head and the combination of capital. Neither of those things exist in the coffee trade to-day, here or abroad. I am absolutely sure of it. And a corner, what is a corner? A corner is when you are unable to buy, when the merchandise is presented to you at the market you are not able to acquire what you wish. Has that condition existed here? I have not known of it. And I am so sorry when you gentlemen, some of you gentlemen, I will say, should be dissatisfied with the advance in the article you deal in.

In all articles, all large staples, the dealers look for an advance in their staple as a chance to make money. They wish, they desire it. And in coffee it seems to be the reverse. And if that reverse feeling has existed, where did it orginate from? I think I can explain it in my own mind: From the fact that during the season of low prices it was very profitable to roast coffee, but more so to sell it in retail. If you remember those seasons coffee sold, from 1886 to 1896, on an average of 15 and 16 cents for option, which meant for ground coffee, according to quality, from 16, 18, 19, and 20 cents. a pound. When the market declined, it declined very fast. But the decline in the price of retail coffee was not quite so fast. A great many families never knew there was a decline in coffee. (Laughter.)

Now, I don't blame the retailer in making all he can. But the system is wrong. The retailer makes no money on flour, sugar, canned goods, he wants to make it all out of coffee and tea. And the chances of making it were very favourable during the long season of declining prices in the green coffee. The usual time of declines that I have known here before, the market turned in six or seven years. This time it was 14 years. It began, the decline in coffee, in 1896, and lasted up to 1910, 14 years.

Now, they got so much accustomed to low prices that either they were not born yet, or they didn't remember the time that coffee was higher; and the prices in retail business you know more about than I do, but from all the information that I could get, there always was the experience that the retailer was very slow to come down on prices, especially in the large cities on the better grades of coffee. The profit was a very handsome one. The expense of doing business was larger and he had to pay higher wages. So he realized he ought to make his profit out of something, and if he could not make it out of sugar and flour he would make it out of coffee and tea.

Don't forget, from 1900 to 1910, we had in this country good prices for a long period in cotton, corn and wheat. There is ten years in the history of the nation that we had no such prices as we had from 1900 to 1910. Sugar was high priced. What did Brazil do? From 1900 to 1910 they got the lowest prices they ever got; the lowest prices on record, and that can only be followed by high prices. And very low prices, if the weather is not so favourable, always brings about neglect. If a man gets a very low price for his goods, he cannot keep his plantation in good condition, and if then they have unfavourable weather, it goes very fast and the crops run down very fast. There is nobody to blame, so far as I know, for the high price of coffee to-day, except Providence and the weather. I don't know of anything else, because nobody has been quite prepared for it. We cannot know exactly, I personally cannot know the variations of an hour. I can tell as a positive certainty that for four years during valorization from 1906, when it commenced, to 1910, valorization never changed prices. The price was always the same, 6, 7, and 8 cents. in the open market. There was no change, nor did it change when the crops failed. Valorization, however, will do what it has to do. It has saved these crops.

And the time is coming when the Government will not be afraid of it. But when the Government makes a loan, it must act according to the conditions of the loan. It could not have obtained the loan without agreeing to certain conditions for sale, and those conditions covering, as I told you already, 500,000, 600,000, 700,000 bags, are that it is within the direction of the committee to double the quantity if the trade takes it, if the trade wants it.

Now, I believe at the end of this year, or next year, 1912, the loan will be paid up. The loan was made originally for ten years, to be paid back in ten years. According to my present observation and the conditions of the loan and what it amounts to, in all probability the total amount will be repaid in 1912. And after that the Sao Paulo Government will not be hampered with any conditions of the loan, nor will the committee be hampered in selling it.

Now, as far as the present time is concerned, the committee has control of the contract, and I am a member of the committee. Suppose you refused to complete the contract. If you enter into a contract when it is very difficult, and it was very difficult to obtain that loan of $75,000,000, you must afterwards keep to your contract, whatever that is, and I certainly shall vote for keeping every part of that contract or leave the committee. And no matter how much criticism will be uttered, we will keep our contract as long as it exists. And I hope the year 1912 will finish these conditions, as far as the loan of the fifteen million sterling—I think it will be all repaid, and it will give the people of Brazil a chance to have time to continue to sell their crop and to sell more. In the meantime, I don't belive there is any chance, except we will give the market all it wants up to double the amount. If the market declines to take it, we certainly will try to protect the market at the expense of the Brazil planter. . . .

We don't know anything more or less what the sun will do than you do. We sold last year stocks that we carried for five years, and sold them out almost completely and not at high prices. Had we known prices would advance so much, possibly we would have held them a little bit closer. By contract the government is barred from buying coffee. The bankers made that the first condition before the loan was given. "You must stop buying anything and stop interfering with the market; you must stop doing anything in speculation, and you must not continue your former dealing." And that contract has been strictly followed up. Nevertheless, you will see sometimes in the newspapers that the Sao Paulo operatives have been buying. It is not true. I might buy, but if I do, I buy for my own account. I don't buy anything for the Government. I do not take orders, and if they gave me orders I would not execute them. I do that for the simple reason that if I accepted an order from them I would violate the agreement which I made myself, and that has never taken place, and I hope in the future you will rest in the conviction that coffee has gone up owing to the smaller crops and not owing to any manipulation.

Now, one point which I wish to make: Supposing we had not done it in 1906. Suppose no one had interfered. Let us take that part of it. Supposing the planters had been left to themselves, I assure you that during the years 1906-07, under the conditions in New York and all over the world, half the planters in Brazil would have become bankrupt. They would have become bankrupt without doubt. And if the coffee planters in Brazil had bankrupted nobody would have worked their plantations. The State of Sao Paulo has raised more coffee than all the rest of the world—and it has raised three or four times more than Rio—why, when I first came to Brazil, in 1876, the Sao Paulo was about 300,000 bags and the Rio crop was 4,000,000. That is as far back as 1876. The Sao Paulo crop is now 8,000,000—that is a small number; it averages ten to eleven. Therefore, it is of interest to the whole world and to the trade in the United States that the industry in the State of Sao Paulo was not left to suffer for money. If you had killed that industry, or killed half of it, the prices for the time being might have been lowered, but to-day we would have to pay 25 cents for coffee. If the State of Sao Paulo had not been able to continue to raise coffee on a large scale, where would the rest of the world have got coffee from? Nowhere else in the world did coffee crops increase. They are just the same; they are standard. In Rio they are always a little lower, and in the rest of the world they are the same. Therefore, it would not by proper reflection, you will see by proper reflection, that it was perhaps not such a crime as some people think that we stepped in and saved many of these Sao Paulo farmers although coffee was at low prices.

A doctor told me once when I complained of not feeling well and not sleeping well—he saw me drinking coffee. He said to me: "Here put aside that coffee. No coffee," he said. "You cannot sleep." I said: "Why, doctor, you are mistaken. The coffee in the cup does not hurt me; the coffee in the warehouse sometimes does." (Laughter.) "And that, I am afraid, you cannot cure."

And it is a remark I made when we commenced valorization. My part in that from the beginning up till now has been a very active one. I have had a great deal to do with it. I don't regret any part of it. I am willing to answer any questions that you may ask, wherein you find something was done in connection with this deal that hurt this country on the coffee trade here or anywhere else; but what I have tried to explain to you to-night is the situation. I will be very glad now to answer any one of you gentlemen here who have any question that you may think of. You may differ with me in my explanation as to what the valorization has been—that it has been very bad. I have heard it said many times. If you give me your reason I shall try to argue it and convince you the other way. If any of you gentlemen can think of any possible way of explaining it differently, I shall be willing to listen. Otherwise don't forget that it would not be American—it would be very un-American—if we should after having for ten years standard low prices that we should not get higher prices. We sell our cotton at 5 cents one time and at another 15 cents. We have sold our wheat one time for 50 cents and at another $1'25; and corn, which they call baking, 20 cents and 30 cents, has been selling at 60 and 70 cents and $1.

If we should stand here and say, "Yes, we are a great big, rich country; of course you must buy at the highest price." But you cannot say to the people down there: You must sell at almost bankrupt prices. We don't live there, we want the coffee cheap. Does anyone think so? I think not. (Applause.)

The Toastmaster—Mr. Sielcken, were you ever called to Washington, or did you ever volunteer to go there to give them any statement of facts about this?

Mr. Sielcken—I was asked that. When I was at my country place in Germany I received several letters from friends in different parts of the United States that the attorney general's assistant had been there and made inquiries to find out whether they had any dealings with me by which it could be proved that we were doing the business of a trust. I was very much astonished to hear that. I met a very highly valued friend who is very well known in this country, Mr. Adolphus Busch, of St. Louis, and he said: "Look here. I understand the coffee houses are responsible for the last two or three cents a pound and that they are trying to prosecute you for that and make you responsible in some way, shape or form." I have just told you, gentlemen, what the situation is; the situation of my house, that we have sold out at lower prices, or higher prices whenever the people wanted it.

This question came up; to what extent I should be made responsible for being a member of the committee, and being a party to the valorization committee in its infancy. I said: "Very well." I wrote a letter, addressed it to Washington, to a member of the cabinet, and I said: "I will answer any question asked of me that may be private or otherwise. I will explain anything that I can of the Sao Paulo Government, provided there is no shorthand writer, no publicity, no publication, because the details of the Sao Paulo Government, who are my constituents, are not my details; I have no right to give their information for publication. But to the United States Government, to my Government, I will answer every question. You can have all the greatest lawyers in the country to put the question, and I will not bring a lawyer with me, and I will be willing to answer every question you put to me, but not for publication." (Applause.)

I will tell you one question the attorney general's assistant asked of our firm which we absolutely declined to answer, because we had no right to. We have sold this year for the coffee valorization committee in this country 600,000 bags. I have always sold as much in the United States as all Europe, although the amount of coffee consigned here is much less. But I have always sold it here as much as to all Europe. I have done nothing to hoist the price up because I have sold as much as possible. But the attorney-general wanted to know the names of our buyers in detail. I said: "No; names of our buyers is our secret. It is a secret of theirs. I will have to have the consent of every buyer himself. Coffee means capital. So much coffee sold means so much money. If you want every detail about that ask the Sao Paulo Government."

"If they publicly state that they will show the details, all right. I will show you the details in the books of the mills of this country. They are all sold legally."

The Toastmaster—Mr. Sielcken, I understand that the valorization idea was to equalize or regulate the prices of coffee. If I am mistaken about that, of course, I would like to be corrected. In other words, I suppose that it was done so that coffee would not be sold at ruinous prices, nor should they be sold at exorbitant prices. I would like to ask you a question.

Supposing those people in Brazil would hold back their coffee down there, as it is claimed they are now doing, whether it is by speculation or otherwise, we don't know—we know that they are, and that they have been accused of being guilty of holding back coffee there—

Mr. Sielcken—At present?

The Toastmaster—If they wish to continue holding back so have you put up the prices to beyond what would be a reasonable price, they would hold it back so that they would compel us to pay 20 or 21 cents, would the valorization committee consider that was entirely out of order, and would you relieve us by giving us coffee at lower prices?

Mr. Sielcken—I will tell you. It was intended that the coffee of the valorization should help out the crops when they were small. The actual quantities to be sold have been fixed, more by the French people than anyone else of us. They took five million sterling. We needed them. They made the actual conditions of the loan, ruling the quantity to be sold and the quantity to be exported. The Government in Sao Paulo has been wanting to equalize the prices. Just what Mr. Schotten remarked just now is correct, as far as it goes.

Now, before I left Europe, there was an application for us to declare sales for next year in advance, so that prices should drop on our declaration. And what we may sell next year we should already declare, but that covering advances would hurt the market naturally. Well, I answered for the committee; I answered that request and I told them we went up there to take part in the market. It was not our business. We should sell coffee between the first of January and first of July of each year, and from the first of July to the first of January the farmers should have their chance to sell. And what we could sell next year we would not declare, because every time we make a declaration it has been misinterpreted and misconstrued and a combine has been made against the market and until it is sold next year we will say nothing until it is sold. (Laughter.) And Mr. Schotten asked me the amount of stock now carried in Santos. That is practically all sold by the farmers, by the planters. The planter sells all the coffee in the interior at these prices. They have not sold at such prices for a long time, and not having sold, they naturally bring it to the market as soon as possible to get their money. I don't believe that any of the coffee in the interior of Brazil will be held back; will be held in the interior. They will have the crop in January, most of it; nearly all the crop will be in. Now, the people who bought it in the interior during September and October got pretty high prices for the coffee, and they held it. The receipts are very large. Everybody in Brazil believes that the coming crop, say in 1912-13, the crop will be the smallest one in 20 years. All those that I know believe so, and those in whom I have confidence and with whom I correspond have told me that the probabilities were for very small crops. They would not give the figures so far. But I don't believe that the crop of 1912-13 will be within 3,000,000 bags as big as this one. This one is 12. I have been told the crops at Rio and Sao Paulo together will not be more than 9. That is my information.

At this season of the year you have an opinion but no knowledge. I may be mistaken. On the best information I gather my opinion is that it will be a 9,000,000 bag crop, and possibly even much less because flowering came so late in October, and late flowering is always in great danger of afterwards being destroyed by heavy storms, rains and so on. That is the danger when the flowering gets so late. We never get large crops, and always remember my remarks in the future, unless we have good flowering in August and September early flowering. we get a large crop; late flowering never. Now, with the 3,000,000 that we have now in Santos, I have cabled two or three times to some of the large holders: "sell your coffee; I think the quicker you sell the better. If you sell, the market will advance, and while you hold it, the market is afraid of you." I have given them the advice to sell, and they have enough money to do their own business. I doubt whether they will sell it on decline, but I don't believe, Mr. Schotten, that coffee will be in very large quantities next year by the time we get ready for valorization. I think you will find the stocks reduced very much.

If the stock could sell above the 3,000,000—you know I am only one out of seven on that committee—the committee is composed of seven, I would vote for selling coffee. But then, I am only one out of the seven, and that does not carry. But I don't believe that question will come up. I think the stock will be reduced, and you will be glad to get your coffee, not at a low price, but not at an excessive price.

The Toastmaster—Gentlemen, I want it to be understood that I was just thinking that some of you probably think that I had been prompted to ask these questions. I am taking this in time. I have no doubt some newspaper reporter will probably get that idea that I have been prompted by Mr. Sielcken to ask him these questions. I assure you, on my word of honour, we had no discussion about what he was going to say, nor any question I was to ask him. He volunteered his statement that if any gentleman wanted to ask any question he should ask him, and so I asked him those questions.

I will ask him a pertinent question which I don't know whether he will like or not like. I will ask him. It doesn't refer to this at all, but in his last talk to me he brought it up, and therefore I take the privilege of asking him. Mr. Sielcken, you were a bear tor ten years?

Mr. Sielcken—Yes.

The Toastmaster—I received telegram after telegram from you when others were telling me flowering was bad in August, September and later on. I received a telegram from you: "My dear Schotten, pay no attention to what they tell you about flowering until December." Now you have just said that July and August flowering will bring large crops. At that time you were a bear. You told me to pay no attention to that. Wait until December. I ask you that candid question.

Mr. Sielcken—That is all right. Last year we had early flowering; 12,000,000, at least, in Santos at least; there was flowering in August and September, and it was supposed we would get 12,000,000 bags of coffee. Most of you gentlemen have seen that, and that the papers always said we need 14,000,000 bags of Brazil coffee, and the yield should be 15 or 16. The early flowering was partially destroyed afterwards, and did not give the amount. In the years when I was bearish, we had one big crop after another, and the time when new trees came into flowering had not yet started. They had not planted lately, but we had new trees, and it takes five to six years for new trees to flower, and where a part of the crop had not been good, taken together with new trees, that was a new experience. I always believed in large crops, and I was right. The average of those crops from 1896 to 1903, we had a steady accumulation of large crops, and that was the time I was bearish.

The Toastmaster—Gentlemen, I want to say that if there is any man here that has a little hesitancy in asking Mr. Schotton questions, I broke the ice, and I will assure you Mr. Sielcken will answer any of you just as cheerfully as he did me. If there is nobody else here who wishes to ask a question—

Mr. Jameson—I want to ask one or two questions, I might want to ask more.

Mr. Sielcken—Yes.

Mr. Jameson—I want to know how much coffee is now in the hands of the valorization committee in the various countries?

Mr. Sielcken—Five million one hundred thousand bags.

Mr. Jameson—I want to get that in detail. How much of that is in America?

Mr. Sielcken—In America, 1,500,000, and the balance in Europe.

Mr. Jameson—The nest question I want to ask is: Who fixes the price? How is that price fixed by the valorization committee?

Mr. Sielcken—By the market.

Mr. Jameson—In other words, the committee does not fix the price?

Mr. Sielcken—No, sir; we don't fix prices.

Mr. Meyer—I would like to ask a question of Mr. Sielcken or somebody better informed on the situation than I am. I would like to ask a question: What is the reason for the increase in the export tax?

Mr. Sielcken—In Sao Paulo the export tax poutes is based upon the value of coffee, the actual value. Now, of course, the coffee has changed its value and got up quite considerably, and all this time coffee has collected on the previous price. But it changes usually two or three times a year. Of course, the price to which they changed has been in existence for three or four months, but that should have changed long ago. Change in the poutes, I should suppose, is 30 points added to the price of the present poute.

Mr. Green—I want Mr. Sielcken to tell the people here assembled the average price on sevens from 1887 to 1897.

Mr. Sielcken—Well, the price from 1886 to 1896, the option price in New York, was an average of 15 and 16 cents.

Mr. Green—What makes the high price now?

Mr. Sielcken—The actual price of high grade coffees in those days, and high grade coffee was very scarce, was four to five cents. on No. 7's, and in 1903 and 1904, 7's were scarce with all the houses, and 8's.

Mr. Green—How can anybody claim that coffees are high to-day when you can get 40 cups to the pound? It is the cheapest thing we have on the table to-day.

Mr. Sielcken—Cheaper than beer.

Mr. Green—Am I right or wrong?

Mr. Sielcken—Right.

The Planters' Chronicle.

RECOGNISED AS THE OFFICIAL ORGAN OF THE U. P. A. S. I., INCORPORATED.

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THE U. P. A. S. I.

(INCORPORATED.)

The Scientific Officer.

Leaving to-night *en route* for the Anamalais, Mr. Anstead will make a tour from which he is expected to return to head-quarters about February 4th, 1912. Arrangements have been made for Mr. T. Bainbrigge Fletcher, R.N., F.E.S., F.Z.S., Offg. Imperial Entomologist, to accompany Mr. Anstead on this tour and study the insect diseases of the district.

Railway to the West Coast.

Under date the 2nd instant the Secretary to the Railway Board invites attention to a letter of his dated July last, which was communicated to the U. P. A. S I. by the Government of Madras in August 1911. That is to say, there has been no change in the situation since that time, and "there is no prospect at present of the early commencement of the Railway in question."

The New York Rubber Exposition.

Mr. A. Staines Manders writes:—

"I hope Southern India will exhibit. They will make a great mistake if they do not come forward and show America the progress that they are making in the production of Plantation Rubber. It will be many years before a similar Exposition is held in the States, and I strongly advise them not to neglect the opportunity, because in a few years' time their Planters will be producing largely. Other countries are increasing their production, and Southern India should get hold of the American manufacturers while opportunity offers, so that they will know where to obtain a first-class article.

"Mr. Richardson has promised to do what he can on his return to your country. I may add that other productions may be shown besides Rubber, as it is permissible for a country producing Rubber to show what else it cultivates."

Proposed "Market Circular."

A correspondent writes:—

"May I suggest that you start a "market circular" in connection with your future issues; here is something to start with.

MYSORE.

Coffee—clean native—Rs.260 to Rs.265 per candy (575 lbs.)
Cardamoms, Rs.40 to Rs.45 per maund (28¾ lbs.).
Pepper, Rs.7 per maund (28¾ lbs.)
Tea, 8 As. per lb. (local only.)"

If planters in the various districts will kindly send in the necessary information regularly, such "Market Circulars" shall be published in due course.

Scientific Officer's Papers.

LXXXVII.—ELECTRICITY AND AGRICULTURE.

The idea that electricity might be a stimulant to plant growth is a very old one and the history of its gradual development was summarised in the course of a recent letter in *Nature* from the pen of Mr. C. E. Benham as follows:—

"Experiments with electricity as a stimulant to plant growth were made with alleged success 165 years ago, when Mr. Mainbray, of Edinburgh, electrified two myrtles throughout October, 1746, for several hours a day, with the consequence that next summer they blossomed sooner than their neighbours (Priestley's 'History of Electricity,' part vii, sec. 4).

"Shortly after this the Abbé Nollet made similar experiments with electrified seeds in pots, and claimed equally successful results. M. Achard, of Berlin, and other independent observers confirmed the experiments; and the beneficial effect of electrification on plant life was almost an accepted discovery when a Dr. Ingenhousz, after exhaustive experiments, completely refuted all the conclusions hitherto arrived at, and proved that the only effect of electrification was to hinder plant life!

"Dr. Carmoy and the Abbé Ormoy later resumed the investigation, and testified to favourable results.

"Next the Abbé Berthelon reconciled these divergent conclusions by announcing that electricity in a moderate application was beneficial, but could be applied in excess with harmful results; and he advocated as the safest method the utilisation of atmospheric electricity, which he said rarely rose to a strength injurious to the most delicate plant. He published a suggestion, recently credited by Sir William Ramsay as a new and ingenious theory of Sir Oliver Lodge's, that the pointed leaves of plants acted as conductors of atmospheric electricity, and were an important factor in the prolific vegetation of forests.

"The Abbé Berthelon, who utilised both natural and artificial electrification, devised what he called the "electro-vegetometer," which consisted of an insulated series of sharp iron points projecting vertically upwards at a mast head and connected by chains with similar iron points pointing downwards just over the plants to be experimented on. He states that "the happiest effects were perceived, *viz.*, different plants, herbs, and fruits in greater forwardness than usual, more multiplied and of better quality.

"Until lately all these alleged successes were supposed to have been imaginary; and the question is, will the recent experiments prove that there was more in the earlier ones than has been supposed."

During the last few years, many attempts have been made to solve the question. Two methods of experiment have been adopted. One is to stimulate growth by illuminating the plants with red light by means of a powerful arc lamp. It may be explained that Chlorophyll, the green colouring matter found in the leaves, absorbs the red rays of sunlight, and some of the invisible chemical rays as well, and from them obtains the energy required to split up the carbonic acid gas of the air and the water supplied by the roots so that the carbon and hydrogen, in them may be recombined with the plant-food to form the various tissues of the plant. Horticulturalists have also retarded plants for special purposes by keeping them illuminated by green electric light. This process of electrical illumination is known as "Radioculture."

This treatment is found to have a very marked effect upon the rate at which seeds germinate, hastening it considerably. Miss Dudgeon, in some experiments conducted at Dumfries, using a Cooper-Hewitt mercury vapour lamp which gives a bluish light, obtained the following results:—

	DAYS REQUIRED FOR GERMINATION.	
	Electric light.	Ordinary light.
French Bean	13	21
Carrot	11	26
Cauliflower	6	26
Maize	8	37
Lettuce	6	12
Maple Pea	6	16
Oats	7	12
Barley	7	12
Wheat	8	16

A second method of experiment has been to pass a current of electricity through a wire net stretched above the crop. The object of this is to induce another current of the opposite kind of electricity in the soil beneath and thus to stimulate the roots and growth of the plants.

When plants are grown under glass a combination of these two methods is possible, and a system has been worked out known as the "Thwaite System of Electro-Culture" on these lines. This system is under trial at the Royal Botanical Society's Gardens in Regents Park, London. Violet light rich in chemical rays which play a leading part in the assimilation of food by the chlorophyll, is projected on to the plants from powerful arc lamps, while at the same time a current is introduced into the soil. Excellent results have been obtained by this system which is said to be very cheap. In the *Gardeners' Chronicle* of June 1910 the following account of such experiments appeared:—

" Evidence is forthcoming from time to time that plants subjected to the influence of electricity grow faster and mature more quickly than others cultivated without this influence. Though we are far from understanding the nature of the effects produced by an electric discharge on plants the large-scale experiments recently made at Evesham and elsewhere would appear to indicate that in the intensive cultivation of the immediate future electric culture will find a place. Many years ago, Lemstrom claimed to have demonstrated the accelerating influence of the electric discharge on the growth of crops, and now the recent experiments made by Mr. Newman on land belonging to Mr. Raymond Bomford, at Salford Priors, near Evesham, appear to justify Lemstrom's conclusions.

" Mr. Newman's experiments, a summary of which is published by Mr. J. H. Priestley, in a recent issue of the *Journal of the Board of Agriculture*, were carried out by means of a better apparatus than has been used previously for the purposes of electrifying the experimental plants. Into the technical details of the electric-installation we need not go; it will suffice for our present purpose to say that a continuous high-tension current was conducted along wires stretched at convenient heights above the plants, and that the arrangements were devised by Sir Oliver Lodge, in co-operation with Mr. Newman. The overhead wires were charged "positively," and thus the current which leaks away from them passes to earth through the plants growing beneath them. When the current, which traverses the plant, thus reaches a certain amount, the germination of seeds and the growth and development of the mature plant show a marked acceleration. If, however, the current exceeds this optimum, a checking of the plant's activities subvenes. To give an idea of the magnitude of the results which have been obtained in large scale trials:—At Bitton in 1905. Strawberries subjected to electrification showed in the case of five-year-old plants, an increase of 36 per cent., and in the case of one-year-old plants, an increase of 80 per cent. At Gloucester, where, as at Bitton, the wires were charged by means of an influence-machine, Beets yielded 33 per cent. and Carrots 50 per cent. more than the control, unelectrified plants. The experiments with Wheat, made at Evesham in three consecutive years, showed 29 per cent. (1906), 29 per cent. (1907), and 24 per cent. (1908) in favour of electrified crops. Finally in experiments under glass in five houses, Cucumbers responded by a markedly larger yield of fruit; for instance, in one house unelectrified, 2,477, in one house electrified, 2,753. Though the cost of installation is considerable, for example, the installation of the necessary electrical plants for a greenhouse amounts to about £50; yet, if subsequent experiments confirm the results hitherto obtained, we shall yet live to see enterprising growers adopting electric-culture as part of their routine practice."

Sir Oliver Lodge considers that the results obtained from attempts to supply electricity from old fashioned high potential sources such as mentioned by Mr. Denham above are untrustworthy since there is no guarantee that the network can be kept electrified during any long period. In a letter to *Nature* replying to Mr. Denham in November last, he writes:—

" It has been attempted in the past, and it is still tempting, to supply electricity to a network by means of elevated spikes, arranged so as to utilise the gradient of potential naturally existing in the atmosphere. But think what singularly perfect insulation would be required to enable electricity slowly supplied in this way to accumulate until a fizzing point was reached. The attainment of such potential over a large area would in this climate be quite impracticable except when a thundercloud was passing overhead.

" The same difficulty of adequate insulation must have militated against many attempts made in the past to supply electricity from artificial but old-fashioned high potential sources, especially when the area to be supplied extended over many acres.

" It must be further remembered that any metallic network not really charged, but kept practically at zero potential by leakage to earth, would be presumably detrimental to the growth of plants beneath it; inasmuch as it would tend to screen them from the natural inductive electrification to which they are entitled."

Sir Oliver Lodge has been experimenting for some years with the application of electricity to agriculture and his son has devised an apparatus for applying electricity to growing crops which is being tested in many countries. During the course of a lecture at Birmingham in November 1910 Sir Oliver said the electrification of the air above the plant was an important factor in its growth. " Such electrification always existed, but by artificial means it could be intensified, the plant stimulated, and the action of feeble sunshine accelerated and assisted by high tension electricity purposely conveyed to the atmosphere above the plants." (*Agricultural News.*)

A description of the modern apparatus used, the method of using it, and some of the results which have been obtained will be found in an article reproduced from the *Times* in the *Planters' Chronicle*, Vol. VI, p. 277.

The Department of Economic Biology at Bristol University have conducted a series of experiments to ascertain what effect a silent discharge of electricity has on plants. An account of these experiments appeared in the *Journal of the Board of Agriculture* in April 1910 and was thus summarised by the *Agricultural News* of 28 May:

"The present position of the controversy may be summed up in the words of the article as follows: It is sufficient to say that electric currents are reported by many observers to have an optimal value for the plant they are traversing, an optimum which probably is variable for different plants and for the same plant at different times; and that up to this optimum, increase in the strength of the currents leads to increased growths, more rapid germination, increased storage of food, and so on, but beyond this strength, the current rather inhibits vital activities and tends to lower the resultant yield from the plant.

"The experiments seem to indicate that more importance should be attached than is usually the case to the effect of the current in accelerating the development of the crop. Such an acceleration would often have the effect of bringing it about that the crop is gathered under better circumstances than if it had to remain until the usual time of harvest. There is the additional consideration that the existence of such acceleration denotes that the vitality of the plant has been raised, and this would have an effect in increasing its power to resist disease: actual indications of such increase have been obtained, but they are not conclusive, owing to the conditions under which the experiment was conducted. Some investigators have stated that they have noticed increased chemical activity in the electrified plants, especially Pollacci, who has obtained indications that leaves can manufacture carbo-hydrates, using the carbon-dioxide in the air, when they are traversed by an electric current, even when there is not sufficient light for the purpose.

"In interpreting the results of work of this kind, regard must be had not only to the effect of the current on the plant itself, but also, on the contents of the atmosphere and the soil. The presence of the electric discharges causes a combination of the oxygen and nitrogen in the air, so that it is possible that, ultimately, there is a very small continuous addition of nitrates to the soil in which the plants are growing. It is also very likely that the current will have its effect on the soil bacteria, and thus upon the interchange that is taking place between the soil and the roots of the plant; the knowledge, however, of this part of the subject is too small for any definite conclusion to be given."

As will be seen from this summary, the whole subject is only in an experimental stage at present. When more is found out about it, it may become a practical scheme, and perhaps it is permissible to dream over an after dinner cheroot of immense yields obtained from coffee and tea estates roofed over with a network of wires from which electric sparks fizz and crackle day and night, while every waterfall is harnessed to powerful dynamos to supply electricity to the surrounding districts, which will not only make the crops grow, but supply power to transport them to the sea-coast. In those days the fields will no doubt be fertilised with cultures of bacteria instead of Poonac, and possibly radio-active substances, which have also been found when applied in small doses to stimulate plant growth.

RUDOLPH D. ANSTEAD,
Planting Expert.

PESTS AND DISEASES.

Locomotion of Young Scale Insects.

In an article bearing the heading given above, which appeared in a recent number of the *Journal of Economic Entomology* (Vol. IV, p. 301) Mr. H. J. Quayle, of the Agricultural Experiment Station, Berkeley, California, gives the results of experiments on the powers of locomotion of the young of the black scale (*Saissetia oleae*, Bern., the red or orange scale *Chrysomphalus aurantii*, Mask), and the purple scale (*Lepidosaphes beckii*, Newm.) which represent the most serious insect enemies of citrus trees in Southern California.

The experiments showed that the wind is not likely to dislodge the active young of scale insects and thus greatly aid their distribution, nor are these tender animals able by their own powers of locomotion to travel over the surface of the soil, under ordinary conditions, in sufficient numbers to account for serious and rapid spread throughout an orchard.

The means of spread of scale insects are described in the following paragraphs taken from the article referred to above:—

"The distribution of scale insects over long distances is effected mainly through the interchange of nursery stock, and over the same general community by birds and active insects, chiefly together with the agency of man in his usual cultural operations, while in the spread from tree to tree or to nearby trees, aside from the above factors, the power of the insects to transport themselves must be taken into consideration. The wind is another factor which may aid certain insects in distributing themselves, either by blowing them directly or with a leaf or light twig upon which they may be resting. Such insects as winged plant lice and the males of scale insects have frequently been observed to be wafted by a gentle breeze or aided in their flight through its influence. Experiments with a foot bellows showed that young black scales are not very readily dislodged from a twig, but once dislodged might be carried a short distance as they fell. Twigs having numerous active young scales had to be brought to within about six inches of the mouth of the bellows before any of the insects were dislodged. It thus requires a stronger wind than usually blows to have any effect on the scales on the tree, but once dislodged the wind might carry them to an adjoining tree, if the foliage of the different trees were in close proximity.

"The experiments recorded here represent but a few of the total number made, but they will serve to show how they average. In the case of the black scale, it was shown that about 4 feet of ordinary orchard soil is about the limit that will be traversed by the active young. Under favourable conditions they might, therefore, through their own powers of locomotion, make their way from one citrus tree to another, or to a second or third tree away. But the number thus travelling would be exceedingly small, as compared with the total. These records were made on soil with an ordinary mulch. Tests were made on their powers of travelling over compact soil, and they invariably showed very much greater progress. A compacted irrigation furrow enabled even the young red scale to travel two or three feet, while in a loose mulch this scale practically makes no progress. The young red scale, in attempting to ascend a small particle of earth, falls back again, and this is repeated time after time. The same is almost as true for the young purple scale. Where there is a fine mulch, therefore, the chance of the young red or purple scale reaching an adjoining tree is practically negligible."

TEA.

Examination of Teas in the United States.

METHOD TO BE USED TO ASCERTAIN ARTIFICIAL COLOURING OR FACING MATTER IN TEA BY CHEMICAL ANALYSIS.

On October 16, 1911, Mr. James F. Curtis, Assistant Secretary of the Treasury, sent the following letter to Collector of Customs at New York, in reference to the examination of teas and the method to be used to ascertain artificial colouring or facing matter in tea by chemical analysis:—

" In the examination of teas imported into your district, with the view to ascertain whether or not they contain artificial colouring or facing matter, it is ordered that the following-described method be used in making chemical analysis, *viz* :—

" From 50 to 100 grams of tea, preferably the latter amount, should be stirred thoroughly in about 200 cubic centimeters of warm distilled water, thus separating from the leaf any adhering particles of facing or colouring matter. This mixture should be then strained through a No. 20 sieve. The supernatant liquid should be poured off and the sediment washed with alcohol on to a filter. The washing process should continue until the alcohol passes off without colour. The sediment should be tested as follows for the different colours:

" A. *Test for Prussian Blue.*—A portion of the sediment remaining on the filter should be warmed in a test tube with 10 per cent. alkali, should be diluted sparingly, and filtered through a small filter paper. The filtrate should be acidified with acetic acid and a drop or two of hydrochloric acid cooled and filtered. A drop or two of ferric chloride solution should be added to the filtrate, which should be allowed to stand. If the liquid becomes greenish-blue and deposits a blue precipitate on standing, it signifies that the tea has been coloured with Prussian blue.

" *B. Test for Ultramarine Blue and Indigo.*—A portion of the sediment should be warmed in a test tube with 10 per cent. alkali, then diluted sparingly and filtered through a small filter paper. The residue left on the filter paper should be transferred to a small porcelain dish, and to it should be added concentrated sulphuric acid. If there is perceptible an odour of sulphureted hydrogen, or if lead acetate paper is blackened by being exposed to the fumes, it signifies that the tea has been coloured with ultramarine blue.

" If the solution gives a greenish colour, turning blue on warming, it signifies that the tea has been coloured with indigo.

" C. A portion of the sediment should be ignited and examined as usual for soapstone, talc, etc.

" By treating with hot 10 per cent. hydrochloric acid, filtering,and drying the residue, the presence of talc or soapstone is indicated by the peculiar soft soapy feel of the residue. Ignite the original tea leaf to ash, wash with cold water, and test extract for calcium, indicating calcium-carbonate; then wash the residue in cold water, extract with boiling water, and test the boiling-water extract for soluble sulphates, indicating gypsum.

" The microscopical examination of the original tea leaves and the sediment collected from the centrifuge is useful as indicating the probable presence of extraneous matter adhering to the surface of the tea leaves, such as dark particles, etc., which should give the usual chemical reactions for colouring matter before being pronounced as such."

RUBBER.

Do Rubber Seeds Hold a Fortune in Store?

In the issue of the 14th October last we dwelt on the potentialities of oil expressed from rubber seeds which has, up to the present time, not yet been attempted upon a commercial scale. Since our article appeared we notice that Mr. Hermann C. T. Gardner dilates on the possibilities of Pará seed in the columns of the "Financier," while experiments have also been carried on at the Agricultural Station, Kuala Lampur, to find out what the working costs, etc., would be to produce such oil, all going to show that interest is being evinced in the subject.

Attention was directed to the potentialities of rubber seed oil some time ago, and during our visit to London we made it a point to consult one or two men whom we considered sufficiently conversant with the subject to illumine us as to whether the manufacture of rubber seed oil was likely to come into the region of "practical politics." Certainly after our interviews with some financiers at home our hopes have been raised considerably, and we believe that rubber seeds hold a fortune in store for us. A number of people whom we met at home seemed to have absolute faith in the possibilities of Pará seed oil, and were only waiting for the initiative to be taken on this side. The great question which we have to face is that of cost in judging the possible profitableness of expressing the kernels for oil. Various estimates have been given in this connection, some ridiculously high, which would knock the bottom out of the whole proposition, and others far too low. Experiments to arrive at cost of production, were made during this year at the Kuala Lumpur Agricultural Station. Children earning 18 cts. per day were put on to collecting seeds accumulated under 12 year old trees with the following results:—

I. 4,200 seeds were gathered at the rate of cts. 3'21 per 1,000.
II. 5,000 seeds were gathered at the rate of cts. 1'15 per 1,000.
III. 4,500 seeds were gathered at the rate of cts. 3'18 per 1,000.

It must be remembered these rates obtained on a small plantation. "On a larger plantation," according to the Director of Agriculture, "it should be easy to collect the seeds at 3 cts. (0'84*d.*) per 1,000. An estimate of 1*d.* per thousand, would, therefore, be on the safe side." We note also that the Director arrives at the conclusion that it will take 426,700 seeds to produce 1 ton of fresh kernels. Allowing a cost of 20 per cent. on drying the weight of 1,000 kernels will be 4 lbs. 3 oz. This will give a total of 533,000 seeds to the ton of dried kernels. The Director considers that the cost of collecting one ton of fresh kernels will be $19'04. There remains to be considered the cost of packing, freight, etc., but Mr. Brain thinks there is at any rate room for a decided margin of profit even with husked seeds selling at £10 per ton in England.

Now we will take our readers through some of the figures which were prepared for us by a gentleman who is ready to start a mill, such faith has he in the future of rubber seed oil, if he is supported, to some extent, monetarily, in the furtherance of his desire. This gentleman, we may mention, has made a special study of the possibilities of rubber seed oil and has even designed the machinery for expressing the same. He comes, therefore, as no novice. He brings a special education to bear on the case. Moreover he is prepared to express a pure white oil. Therefore we have got the man, we have got the mill and we only want the money. That is the position. From numerous enquiries which he has made and which he was good enough to impart to us he understands that the oil producing kernel is of an average weight of about half that of the whole seed and that it will take 10 acres of rubber trees to produce one ton of kernel for use in the oil mill.

The following figures will explain our calculation:—

200	trees	per acre.
166	seeds	„ tree.
30,000	„	„ acre.
156,000	„	„ ton.
300,000	kernels	„ „

After careful investigation it has been proved that 35 per cent. of the kernel is oil and a mill worked on economical lines would be able to make an average extract of 40 per cent. of oil, this being equal to 8 cwts. of oil from each ton of kernels, the balance of the oil remaining in the 12 cwts. of oil cake. Our informant places the cost for collecting at three-farthings per 1,000 or 9*s*. 6*d*. per ton. The Mill management could afford to pay 35*s*. per ton of seed for gathering and carting to the Mill. Our informant suggests that in the case of promoting an auxiliary company to produce Rubber Seed oil and Cake it would be preferable to have Rubber Seed Companies to pool their seeds and take proportionate interest in the Mill.

Apart from site, machinery and contingencies, which should approximate £2,000, the estimated cost of milling the oil from 1,000 tons of seed including delivery at 35*s*. per ton and wages, superintendence and freight should come to £6,500, while on the other side 200 tons of drying oil produced from the above amount of seed at £40 per ton should give £8,000, which with 300 tons residue in the shape of cake, at £7 per ton, should yield £2,100 or altogether £10,000.

The above figures are certainly very tempting. The question is, and it is after all the crux of the whole proposition, can we get the seeds collected at about 5 cents the acre? The men who should be able to answer the question are the Planters, who, if they could be induced to co-operate with the Mill, would be able to bring matters to a head.

We notice that Mr. Gardner, in his article, raises the question as to the value of the cake, and what effect the replacement of Linseed Oil and other cake by Pará seed cake would have upon the vitality of cattle, etc. We think that Mr. Gardner has rather laboured this question, as it has already been proved we believe that the Pará cake is quite suitable for the purposes of fodder and that once the question of the cost of collecting the seed is determined the rest should be all smooth sailing, and that a great Industry is waiting for us. In fact as many of us tread on the thousands of rubber seeds which lie in our way on a rubber estate are we not killing the germ of a new Industry, and how long are we going to let the thousands of these seeds to be trampled to death instead of being taken to the Mill?—*Grenier's Rubber News.*

Costs of Production on Estates.

Many plantation Companies will soon be compiling the accounts for the year ending December 31st, 1911. The time is therefore opportune to express the wish that some serious efforts be made to give detailed costs of production, per pound of rubber for the year. Already we have received some excellent reports, notably those of the Kuala Lumpur Rubber Company, and the F. M, S. Rubber Company, in which the costs of the various items are enumerated.

Though we make this request, knowing that it will have a beneficial effect if acceded to, we are fully aware of the variation which must be anticipated in the total cost of production on various estates in the east. The variation is due to the great differences now existing on estates, but these will gradually disappear as the trees grow older and labour conditions became more uniform.

INFLUENCE OF COST OF LABOUR.

The average daily cost of cooly labour has a great influence on the cost of production. There are many estates in Ceylon and Malaya where the daily average is 38 cents. but in the former country that is equivalent to 6*d.* and in the latter 10½*d.* Fraser (I. R. J. August 22nd 1910) stated that tapping was being done at from 10 to 18 dollar cents by Tamils and 22 to 25 cents by Chinese but this, he thinks, will be improved upon. A planter met in the F. M. S., felt certain that with crops of 500lbs. per acre the F. O. B. cost of rubber might be brought down to 8*d.* or 9*d.* with Tamil tappings in the F. M. S.; 1*s.* to 1*s.* 6*d.* with Chinese tapping in F. M. S.; 4½*d.* in Ceylon without manuring; 6*d.* in Ceylon with manuring.

Another point which influences cost is that some managers charge the actual cost of the labour employed in tapping against that item, instead of charging the average coolie cost over the whole estate. A case in point was where the tapping coolies were paid at the rate of 45 cents, when the coolie average over the property was 35 cents. On another property where the average rate of coolie pay was the same, the cost per day for tapping coolies was below the average, *viz.*, 30 cents on account of only podians (boys) and women being employed for such work. Weeding and other work is just as essential as work more directly concerned with the collection and preparation of rubber, and it would appear to be better to charge the average coolie cost for the estate rather than the cost of individuals employed for the time being on this particular work.

OTHER FACTORS AFFECTING COST.

It is obvious that the cost of production must be largely determined by the ages of the trees and methods of tapping employed. The yield and therefore cost also varies according to the distance between the trees, the percentage of trees in the tapping round, the season, and the percentage of crop grades. The large variation in the cost of tapping knives will even account for considerable differences between the costs of production on adjacent estates. Land river and sea transports, local agency charges, and many other factors are also responsible for the enormous variation in cost at the present time.

DAILY TASKS IN COLLECTING.

The weight of rubber brought in by each coolie per day has been given in the annual reports of various companies. On Lanadron estate the outturn in 1908 (trees 5 to 9 years) was 3'67 lbs.; in 1909 (trees 6 to 10 years) 3'18 lbs.; in 1910 it was 2'63 lbs. from trees 3 to 11 years. Ledbury estate obtained 2'14 lb. per coolie per day in 1909 (trees 7 to 10 years) and 2'97 lbs. in 1910 (trees 3 to 11 years.) On Sione estate 2'69 lbs. were obtained in 1909 from trees 4 to 12 years old and 1'97 lbs. in the following year from trees 3 to 13 years old. The Singapore and Johore rubber Company report a completed task of 3'32 lbs. per coolie for 1910. Jementah estate report 1'21 lbs. for the same year, the trees on this property being 4 to 16 years old.

On several estates an outturn of 5 lb. of rubber per day per coolie is obtained from 10 year-old-trees, a fact which indicates that a considerable reduction in cost of collecting rubber will be possible when Hevea trees reach the age mentioned.

PROPORTIONATE COST ON ESTATE.

If the accounts of estates in full bearing are examined it will invariably be found that the main item of expense is that included under the heading of tapping and manufacture. This amounts generally to from 50 to 80 per cent. of the total cost of production and includes cost of tapping, utensils, washing, drying, packing, transport and shipping. Cost of cultivation, which includes roads and drains, weeding, supplying, pests, forking and tools, is usually next in amount and averages about 10 to 15 per cent. of the total cost. Buildings and repairs are usually from 5 to 7 per cent. General charges also vary, including salaries, insurance, local and visiting agency fees, rent, medical and contingencies, etc., and on estates in view account for from 10 to 16 per cent. of the total costs of production. To the above must be added London costs, which include offices, directors' fees and commissions.—*India-Rubber Journal.*

Planting Rubber Company Accounts.

The last number of "The Accountant," the leading organ of opinion in the accountancy world, contained an editorial pronouncement on a subject that is at present very much to the forefront in the minds of those connected with rubber Company finance.

The point (raised by a correspondent) is this :—

"What is the accepted practice in the case of a rubber Company "formed some years ago which has now arrived at the producing stage? Is "it permissible to add to the cost of the assets the general expenses in "London, directors' fees, etc., during the non-productive period; and can "debenture interest paid during that period be treated in the same way or "would it be necessary to conform to the conditions governing the payment "of interest during construction laid down by the Companies (Consolida-"tion) Act 1908?"

Our contemporary deals with the subject as follows :—

"It is perhaps somewhat early in the day to talk about an accepted "practice in connection with the accounts of rubber Companies: but there "can be little doubt that the general principles governing such accounts are "very similar to those governing the accounts of Mines—or for that matter, "tea plantations; or indeed any other form of industry where some appre-"ciable time elapses between the formation of the Company and the date "when its equipment has reached a revenue-producing stage. The method "of accounting that is applicable in the one case would certainly seem to be "equally applicable in the other.

"Of course the great bulk of expenditure incurred by any such Com-"pany during the earlier stages of its career is without question Capital "expenditure; expenditure incurred once for all; and incurred with the "object of perfecting the equipment of the Company so that from that time "forwards it may be in a position to earn profits to the best advantage. The "only doubtful point is as to whether expenditure not incurred once for all "—expenditure which by its nature is likely to recur—can also be treated "as Capital expenditure until the producing stage is reached. The items "cited by our Correspondent as coming under this heading 'General ex-"penses in London' and 'Directors' Fees,' are of course not altogether "exhaustive in this connection but they are sufficiently so for our present "purposes. It is, we think, perfectly reasonable to assume that such ex-"penditure is really a part of the actual expenditure incurred on the spot "which is unquestionably Capital expenditure; that is to say that it is "headquarters expenditure connected with the direction of the capital outlay "abroad. Had this latter expenditure not been supervised from Head-"quarters additional expenses would have had to be incurred in supervision "on the spot where an equally satisfactory result would be expected. Indeed "the only thing we know of that seems to throw any light whatever upon "the matter is the practice of the Local Government Board, which is "certainly not very much to the point, and is but a very poor guide on "matters of principal connected with accounts. Still for what it is worth, "it may be mentioned that the practice of the Local Government Board is "not to allow local authorities to borrow for the purpose of providing money "to pay the wages of permanent employees, even where the work actually "done by those permanent employees is unquestionably Capital expenditure "which if performed by outsiders, could have been so treated and borrowed "against accordingly. Probably the Local Government Board would "take a similar view with regard to the expenditure of Rubber Companies, if "the matter came officially within its cognisance; but as it does not it "seems hardly necessary to carry the matter further, except perhaps to state "that the general view among business men undoubtedly is that this attitude "on the part of the Local Government Board, while perhaps useful in "practice as guarding against possible abuses, is indefensible in practice.

"A perusal of the audited accounts of certain rubber companies to "which we have had access shows that, rightly or wrongly, the practice "seems to be to capitalise all expenditure during the non-productive stage "and the practice is one which, it seems to us, cannot very well be found "fault with. We may mention that the published accounts of the New "Zealand Midland Railway Company, Ltd., appear also to have been dealt "with in this way during construction and the circumstance that these "accounts were audited by Messrs. Cooper Brothers & Co., is a sufficient "guarantee, that this policy was not adopted without very careful consider- "ation by those best competent to form an opinion.

"If this be the proper way of dealing with London Office expenses, "directors' fees and the like it follows *a fortiori* that the same treatment "may be accorded to debenture interest. The provisions in the Companies "Act as to the payment of interest during construction apply only to interest "on Share Capital; but here again some corroboration of our view is to be "found in the fact that even with regard to interest paid on Share Capital "during construction, under the provisions of the Act of 1908, there is "nothing to prevent a Company from capitalising such interest permanently. "All that the Act requires is that such interest, unless charged against "revenue, shall appear as a separate item on the face of the Balance Sheet, "the intention doubtless being to encourage this being written off against "revenue as soon as circumstances permit. Similarly it might be suggested "that it would be good policy for a rubber company to write off such items "as administration expenses incurred during construction against revenue as "and when opportunity offers; but that of course is a very different thing "from saying that no profits can be divided until the whole of such expen- "diture has been written off.—*India-Rubber Journal.*

South American Rubber Authorities in Ceylon.

We received a visit to-day from Dr. Jacques Huber, Ph. D., the well-known South American Rubber authority, and the Director of the Goldi Museum and Botanical Garden at Pará (Brazil), and Mr. C. E. Alcers, who is representing British capitalists interested in the Brazilian trader and investments there. . . .

THE PRESENT SITUATION IN PARA.

Dr. Huber, discussing the future of the industry in the Amazon Country, observed that the State of Pará produced only wild rubber taken from trees in the forests, and the conditions of extraction were very different from the conditions in the East. There was a great difficulty in regard to labour, for instance. Hitherto the Amazon Country had produced the bulk of rubber, but in a few years the production of the plantations of the East would far exceed the production of the Amazon Valley, which was more or less stationary.

"It is realised," Dr. Huber continued, that with the low cost of production of plantation rubber and the great output it will be difficult for the Amazon Valley to compete with the plantations in the East. The situation can only be met by lowering the cost of production, and I think it will be found difficult to reduce the cost to the necessary extent. The export duties are very high at present, and a reduction in that direction is necessary to meet the situation.

"I think that, if the price of rubber goes below three shillings, it will be very difficult to maintain the production, and, if it is over that amount, there is bound to be a reduced production during some time. There will be a fresh increase when the conditions are met with—when labour is cheaper, for we hope to bring about a reduction in the high rates of wages."

Dr. Huber explained that much of the trouble was due to the high cost of food, owing to so much of it having to be imported from the South of Brazil, Europe. and other parts, and only a little being produced in the State of Pará. They hoped to overcome this difficulty to a great extent, however, and there was a possibility of certain regions where rubber was produced producing food as well, with the result that food would be cheaper. The high cost of labour was, in a great measure, the result of the high price of rubber. When the price fell wages would also fall, although it was impossible that they could obtain the low rates that prevailed in the East. That was impossible.

When the price of rubber became low, Dr. Huber continued, some districts would be abandoned, owing to the heavy freight rates, and the better situated districts would improve and cheapen their methods. They would thus produce a lesser quantity at a cheaper rate, and eventually they might possibly produce some of their rubber at three shillings. It was a mistake to imagine that the industry in Brazil would go out of existence, but there would be a considerable reduction. It would be impossible, declared Dr. Huber, to eradicate entirely what had been for fifty years the first and principal industry of the country. The people depended upon the industry. It would never disappear entirely, but, of course, they had to look for other natural productions in order to preserve the prosperity of the country. In this direction the Government had already taken steps to encourage agriculture in a general way, such as the cultivation of cocoa, and in poly-culture, and had founded experimental stations, which were the beginning of rubber culture.

Discussing the chances of competition with the East, Dr. Huber said that it would be impossible to compete with the plantations here, but, perhaps, with the development of agriculture generally, it might be possible for certain districts still to compete with the East. But development would essentially be slow, the country being so sparsely populated. One could imagine how sparsely when he mentioned that they had, approximately, only one inhabitant to every square kilometre. They could not change these conditions in a few years; it would be a development which would run into a great number of years.

Dr. Huber, asked his idea in visiting the East, said that he and the gentleman with him were doing so in order to obtain a general idea of the plantation industry and of the probable future of the industry in the East, so that they might compare their own districts with some in this part of the world. Dr. Huber will make scientific observations which will be of much value. He will see how the trees have adapted themselves to the new conditions, and study the varying condition regarding the height, soil, and country. . . .

Dr. Huber and his colleagues, . . . expect to be in the island three weeks at the longest. They are going to Penang and will spend some months in the Malay Peninsula and in Sumatra and Java.—*Times of Ceylon*, January 3.

Law for Encouragement of Rubber Cultivation in Para.

Referring to Laws in the State of Pará for the protection and extension of the rubber industry, H. M. Consul at Pará (Mr. G. A. Pogson) reports the enactment of a further law (No. 1,214, dated 4th November), providing for the grant of concessions to national and foreign companies registered in the State for the cultivation of rubber (*Hevea brasiliensis*), cacao, nuts, &c.

The privileges offered include grants of public lands up to 200,000 hectares (about 494,000 acres); reduction of the export duties and State dues upon the rubber, &c., produced by 50 per cent. during the first ten years from the date of the first shipment, decreasing by 10 per cent. for each ten-yearly period up to fifty years; reduction of State railway rates and of the freight charges of steamship lines sub-ventioned by the State; waiving for ten years of the industrial and professional State and Municipal imposts upon the company's premises.

The concessionaire companies will be obliged, among other things, to plant not less than 50,000 rubber trees during the first five years of the concession, and 20,000 trees annually after that period; to comply, as regards their produce, with the instructions of the Department of Agriculture; and to concede to the Government the supervision of the whole activity of the companies. In case of failure to plant a minimum of 50,000 rubber trees within the first five years, the concession will become void.

The State Government will try to obtain from the Federal Government, on behalf of the concessionaires, a suspension of taxation as regards the importation of machinery and anything else required for the preparation and cultivation of the soil.

Tapping Experiments with Castilloa in Grenada.

An account of the results obtained from tapping two Castilloa trees at the Botanic Gardens, Grenada, has been forwarded by Mr. G. G. Auchinleck, B. Sc., the Superintendent of Agriculture. An examination in the laboratory, of the rubber obtained, gave the following percentages: loss on washing, 2·01; caoutchouc, 80·05; resin, extracted by acetone, 16·65; ash, on crude rubber, 1·41.

Mr. Auchinleck states that the latex was obtained by lightly scoring channels with a Golledge knife, and puncturing the floor of the channels with a chisel; good results were not obtained from the use of the knife alone, as it tended to close the latex vessels. One side of each tree received a single perpendicular cut 2 to 3 feet long, with four or five subsidiary channels about 18 inches long and 8 inches apart; Coagulation was effected with 2 or 3 oz. of acetic acid, in wooden vessels. The total yield of dry rubber was somewhat small, for the trees were at least nine or ten years old; it amounted to 70·65 grams (2¼ oz.) An explanation of the last circumstance is suggested in the fact of the dryness of the soil of the Gardens, and that tapping was only done on one side of each tree. The sample of rubber obtained became tacky in four months.

The results of the experiment are of special interest, as they are the first information of the kind that is available from Grenada.—*Agricultural News.*

OFFICIAL PAPERS.

Agricultural Department, Madras.

THE PRESERVATION OF FARM-YARD MANURE.

Most of the soils of South India are deficient in organic matter and if the fertility of these soils is to be properly maintained, it becomes necessary to supply this ingredient periodically in addition to the usual plant foods. The manures most suited for this purpose are those classed as "bulky organic manures" and of these Farm-yard manure stands pre-eminent and its use can be confidently recommended wherever it is available.

Farm-yard manure may be used in the fresh state, *i.e.*, as voided by the cattle, but this course is not practicable when the land is under crops and, in addition, it is advisable to use manure which has been stored for sometime as, by this storage, not only is a more uniform manure obtained, but the plant foods contained in the dung are brought into a state to be easily assimilated by the crop. During the period of storage many changes take place in the composition of the manure, brought about by bacteria and other low forms of vegetable life, which bring the manurial ingredients into a soluble form. These changes, although making the manure more valuable to the cultivator. are always accompanied by more or less loss of the manurial ingredients and consequently the system of storage which reduces these losses to a minimum is, from this point of view, the one to be adopted.

The main losses which occur during the storage of Farm-yard manure are due (1) to the liquid portion draining away and carrying with it the soluble constituents (2) to loss of nitrogen in the form of easily vapourized substances, and all systems of storage to be economically sound must be based upon principles which tend to counteract these losses without at the same time unduly interfering with the course of the fermentation of the manure.

This is best obtained by using some kind of litter in the cattle shed, in order to absorb the urine and prevent it draining away. The best materials available in this part of India are dry earth, or (in the districts where groundnuts are grown) groundnut husks.

The method of using these is as follows :—

(1) Dry earth is spread, at the rate of about two cartloads per pair of bullocks, on the floor of the cattle shed. The dung is removed daily, and the earth kept dry by being turned over wherever it has been wetted. The dung is put into a pit not less than three feet deep. The earth remains sweet and forms a good bed for the cattle for five months. At the end of this time the earth is removed and forms a very good manure, certainly as good as the dung without the urine. The urine-earth can be put on the land like ordinary farm-yard manure with good effects.

(2) Groundnut husks, which are obtainable in very large quantities in the tracts where groundnuts are grown, are spread six inches deep in the cattle shed. The dung is removed daily and the groundnut husks stirred up. These are quickly broken up fine by the treding of the cattle, and remain sweet for about a month. Then they should be removed and put in the pit along with the dung, and another lot of husks spread in the cattle-shed. The husks, having absorbed the urine of the cattle, form an excellent manure, and should be used like ordinary cattle manure.

Whatever the system finally adopted, it is of the utmost importance to prevent the urine draining away, as this constituent of farm-yard manure contains a very large proportion of manurial ingredients. This can be overcome to a large extent by the use of a suitable litter material which will absorb the urine and so prevent its loss by drainage. The best litter, and one which is generally available, is the waste fodder of the animals, but leaves, weeds and the ordinary waste of a farm answer well and, if these be not available, recourse may be had to ordinary soil. The necessity for using ample and suitable litter being apparent for all systems, the different methods of storage may now be briefly reviewed.

The chief methods adopted for the storage of manure may be designated as the Box, Pit, and Heap systems and this classification covers in a broad sense all the methods generally adopted. In the Box system, the animals are placed in a loose box, with a thick bed of litter to which the waste fodder is added daily. The dung of the animals is trampled into, and intimately mixed with, the litter, which also absorbs the urine. In course of time the whole is trampled into a compacted mass, and by thus excluding excess of air, the fermentation is kept within bounds. In the Pit system the animals are placed on a hard floor and the dung, urine, and waste litter is daily thrown into a pit dug in the soil of the yard and made as water-tight as possible. Dry earth is sometimes thrown on at intervals in order to absorb excess of liquid and often in very dry weather water is added so as to keep the mass at the requisite degree of moisture. In the Heap system the animals stand on a hard floor and the dung and litter are daily collected and thrown on a heap in the open. Sometimes in this case earth is also added.

These three systems were under trial on the Government Farm at Bellary for many years and the average results obtained may be taken with confidence. These are given *in extenso* in the following table:—

System.	Weight of manure produced by a pair of cattle per annum.	Lbs. of nitrogen con-tained.	Lbs. of potash con-tained.	Lbs. of Phos-phoric acid con-tained.	Approxi-mate manurial value in rupees	Lbs. of organic matter present.
Box ...	10,140	90·7	155·3	56·2	69·4	3,020
Pit ...	9,830	55·5	70·0	46·3	37·0	1,765
Heap ...	6,070	60·0	59·8	44·5	46·0	2,168

This table shows clearly that, from the same number of cattle, for the same length of time, and under the same conditions, the manure given by the Box system is much greater in amount and contains a greater proportion of all the manurial ingredients, and the value of the manure produced far exceeds that of the others. Compared with the Pit system, the Heap system has given somewhat better results, but this only occurs when the heap is carefully protected from heavy rains and from strong winds. If these precautions are not taken, then the losses caused by the rain washing out the soluble ingredients and the wind removing solid particles can become very serious and considerable loss to the cultivator ensue. Further if the heap is allowed to become too dry, the heat produced by the decomposition may become so great as to cause the destruction of part of the manure.

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THE U. P. A. S. I.

(INCORPORATED.)

The Planting Member of Council.

As the Hon'ble Mr. J. G. Hamilton hopes to spend a few days in Madras next month he has intimated his desire to receive early notice of any business he is desired to take in hand, and has asked that full particulars may be given to him in every case.

Scientific Assistant for Coorg.

The necessary financial guarantee having been received, efforts are being made to secure, at as early a date as possible, the services of a competent Scientific Assistant to take up work in Coorg.

Specimens for the Scientific Officer.

Planters who send specimens of plants, etc., to the Scientific Officer are requested to kindly see that particulars (including name of the sender) are noted either on a label attached to each specimen or on the package or cover containing them. The entry of the name, etc., on the outer postal cover alone is not always a satisfactory method.

The S. I. P. B. F.

As the result of an application made by the Kanan Devan Planters' Association the sum of Rs.150 has been paid to the Warden of the Bishop Cotton Schools in Bangalore for expenditure, at his discretion, for meeting such expenses as are urgently necessary for the present welfare, and to help towards the education, of young Edward Claridge, son of a deceased planter.

Labour Circulars.

Several inquiries and some orders have come in recently. It is, therefore, as well to explain that the circulars are not ready. Mr. Aylmer Ff. Martin sent drafts round to the various District Planters' Associations. When opinions have been expressed the revised draft should, according to the decision arrived at last September, be submitted to the Chairman of the U. P. A. S. I. Only after that can arrangements for printing the circular be made.

Mr. Martin writes that he is still in correspondence about the circular, but hopes to have things settled at an early date.

Obviously the cheapest printing can only be secured if *large* orders are placed. It is very desirable, therefore, that every District Planters' Association that requires these circulars and has not already sent in its order should inform the Secretary as soon as possible what quantity is required, and in what language or languages. Then, as soon as the final draft is received, the requisite number of copies can be printed without delay.

Notes and Comments by the Scientific Officer.

146. *Root Diseases of Tea.*—In this number of the *Planters' Chronicle* a most interesting Circular on Root Diseases of Tea written by Mr. Petch in his usual lucid way and published by the Royal Botanic Gardens, Ceylon, is reproduced. It should be carefully studied by all Tea planters. The Root Diseases of Tea in South India have not been carefully studied. The commonest diseases with us are closely associated with dead stumps of *Simplocos spicata* and *Grevillea robusta.* Mr. Petch considers it probable that the disease which originates on stumps of *Simplocos spicata* is due to the fungus *Poria hypolateritia*, and when I sent him a specimen from a tea bush which had died near one of these stumps some time ago, though unable to determine the fungus exactly owing to the specimen being a bad one for the purpose, he said he thought it was in all probability *Poria.* The fungus which originates on *Grevillea* stumps is *Ustulina zonata*, and probably it will turn out on careful examination that our disease is caused by the same fungus for, as Mr. Petch says elsewhere, "it is being abundantly demonstrated that plant diseases are identical throughout the Tropics." This being the case, until at least we have further information, Tea planters in South India should carefully follow Mr. Petch's instructions for dealing with and preventing these two diseases, *Poria* and *Ustulina.* It will be found that his recommendations are very similar to those I have given from time to time when writing about Stump Rot in Tea. At the same time I would call the attention of those who are planting *Albizzia* among Tea to what is said about it in this Circular. "During the last two or three years another source of infection has arisen in certain districts. *Albizzia moluccana* has been planted through Tea, and in many cases it has been allowed to grow to an enormous size. Recently quite an epidemic of *Albizzia* felling has occurred and the dead stumps are already giving trouble by serving as a starting point for *Ustulina zonata* as well as for another tea root disease caused by *Botryodiplodia theobromae.*" On many estates here *Albizzia moluccana* and *Albizzia stipulata* have been, or are being planted and from the point of view of shade and green dressing they cannot be said to be a success. We should profit by the experience of Ceylon and not lay up future trouble for ourselves in the shape of Root disease when these trees become big and must be removed. In other words they should be removed now while they are small and easily grubbed out, and some better shade or green dressing tree substituted should this be necessary.

147. *Availability of Nitrogenous Fertilisers* :—In judging the value of a fertiliser it is necessary to consider not only the total amount of plant food it contains but also how much of this the plant can use at once. Some substances contain a large amount of plant food in an insoluble form and this is of little immediate benefit to the crop though it may become gradually soluble and so available in a shorter or longer period after it is applied. The planter usually wishes for an immediate return in increased crop for money expended on fertilisers, and so materials are used which are immediately available to the plant. This matter is of great importance where Nitrogen is concerned, because Nitrogen is the most expensive of all the plant foods. In the course of some experiments at the Agricultural Station at Connecticut it was found that the order of availability of Nitrogen in some of the more important Nitrogenous fertilisers was, (1) Nitrate of Soda, (2) Castor Poonac, (3) Cotton Seed Meal, (4) Linseed meal, (5) dried fish, (6) dried blood, and it is useful to bear these results in mind when selecting nitrogenous fertilisers.

RUDOLPH D. ANSTEAD, *Planting Expert.*

DISTRICT PLANTERS' ASSOCIATIONS.

North Mysore Planters' Association.

Proceedings of Quarterly General Meeting held at Balehonnur January 11th, 1912.

PRESENT.—Messrs. R. G. Foster, C. H. Trevor-Roper, C. S. Crawford and A. F. Evetts (Honorary Secretary). By Proxy:—Messrs. H. G. Bonner, D. Mathias, C. P. Reed and S. L. Mathias.

Owing to the unavoidable absence of both the President and Vice-President, Mr. A. F. Evetts was unanimously elected to the Chair.

DASARA DELEGATE.—Mr. H. Pilkington's report was read. The meeting passed a hearty vote of thanks to Mr. Pilkington for having so ably represented this Association.

ASSISTANT SCIENTIFIC OFFICER.—Resolved: "That in view of the large sum of money required, immediately, to meet the initial outlay in connection with the engagement of an assistant the Honorary Secretary be, and is hereby authorised to draw against the reserve account till subscriptions come in and the money can be replaced."

LABOUR DIFFICULTIES.—The Honeyvale case was postponed for discussion at the next meeting owing to the absence of Messrs. Bonner and Morgan for reasons given by them. Resolved: "That this meeting is of opinion that the time has arrived for this Association to fall into line with the other planting districts of Southern India and take such steps as may be necessary to secure an adequate supply of labour." Certain suggestions were then formulated to be notified to all members of the Association for consideration and discussion at the Annual General Meeting.

COUNCIL OF MYSORE PLANTING ASSOCIATIONS.—Read proposal of the Bababudin Planters' Association. This Association endorsed the B. P. A. proposal and was decidedly of opinion that each Association should be equally represented at its meetings to form a quorm.

COFFEE STEALING.—Read Mr. E. C. Kent's letter dated 30-10-11. The meeting, while sympathising with Mr. Kent, regretted that it was unable to move in the matter until a copy of the judgment was furnished.

KALASA TELEGRAPH OFFICE.—Read letter dated 3-11-11 from Director of Telegraphs, Madras circle, to Resident in Mysore. Resolved:—"That the Honorary Secretary do write to the members concerned asking them whether they are prepared to furnish the N. M. P. A. with the necessary guarantee to enable it to forward the same to Government."

SANDERSON MEMORIAL WARD.—The Honorary Secretary announced that the circulation of a subscription list for the building of a store-room had resulted in the sum of Rs.155 being subscribed, of which Rs.145 has already been remitted to the Deputy Commissioner Kadur District.

CURRENCY QUESTION.—Read circular No. 66/11 from Secretary, U. P. A. S. I.

(Signed) A. F. EVETTS,
Hon. Secretary.

The German Imperial Customs authorities have published a return of the amount of coffee on which duty was paid during the first eleven months of the year 1911. They show that 169,569 tons paid duty during this period against 155,388 during the same period last year. The increase has taken place entirely during the last four months, and suggests that the country is by no means so bare of supplies as the market manipulators would have one believe.

CORRESPONDENCE.

Labour Problems.

Dear Sir,—I think that Mr. A. Ff. Martin's letter in your issue of the 6th instant calls for some comment, as in it, as in his speeches at Bangalore last year, he continually affirms that the Anamalai Planters' Association wants legislation and nothing but legislation in dealing with Labour Problems.

He has grounds for such an opinion, I admit, but this is partly due to the unfortunate circumstance that through a series of difficulties no delegate from this District direct was able to attend the last meeting of the U. P. A. S. I. We were very ably represented by Mr. Barber but even he did not fully realize what had taken place in our discussions here, though he carefully pointed out that we *would welcome any Resolution showing that we are united on any labour point whatever.*

If Mr. Martin will carefully read through the speech prepared by some of our Members for our delegate, who unfortunately could not attend the Meeting, but which Mr. Barber kindly read out to the Meeting, *he will not find a single word about Legislation in it*, neither was there any reference to Legislation in the Resolution that we wished proposed. The wording of our resolution was changed at the last moment, as it was a too general one to come after the specific one passed immediately before it.

It is true that the Anamalais have, since its inception, been unanimously in favour of the Registration Scheme, but seeing that most people consider that further legislation on Labour matters is hopeless, we are ready and willing to bow to the inevitable, but by no means ready to do nothing else at all. We have *not* asked for some guarantee that the U. P. A. S. I. will take up a strong line of action about legislation, but to take up a united strong line of action *against unprincipled methods of recruiting.* Our argument in the speech Mr. Barber kindly read for us was to show that large sums of money were being wasted in wild and speculative attempts on the part of individuals to cope with competition, which could be profitably employed in a *united* organisation, in the first place to strangle out of existence all such competition from over-seas as is carried on in a manner that is unfair and deceitful both to our coolies and to ourselves, and in the second place, to deal fully with inter-district troubles as regards labour.

The solution of the problem lies in the speech I have referred to, the concluding paragraph of which ran :—" Planters have often been accused of a want of business capacity ; here lies the opportunity to prove the reverse. It is surely possible for our best business men, with the support of the Directors of the many large planting concerns, to evolve a scheme that will deal adequately with this most urgent question. The figures I have quoted show that money is available and no opposition on the score of expense can be conscientiously maintained."

Hence it is clear that the Anamalais ask for a United Business-like Campaign and this is where the difference lies between Mr. Martin's ideas and ours, as, though he is very rightly tackling the question from a business point of view, he is, to our mind, making a grave and selfish error in leaving it to each individual district to work out its own salvation. If this is all that is to be done as regards the most important problem before us, it will mean that other subjects in planting politics can be best solved by each individual District, and will be a rift in the lute that will disunite the U. P. A. S. I.

Mr. Martin glibly remarks that he has *nothing to add* to his writings in the Press and his speeches at Bangalore, and yet a few lines lower down he clearly states that his advertisement scheme is only a way of introducing the subject and the beginning of business, and adds that the "follow up" is necessary. This latter is the one point that hitherto he has studiously avoided and which our Association would have liked to have thrashed out with him had he consented to have met one of us in conference. This is the one point in which we should like to see every planter unite, in raising and maintaining a thoroughly business-like organisation fully equipped to be able to trace out and expose all unprincipled methods of recruiting, and to see that fair play is accorded to every one; an organisation whose decisions shall be, morally, law to every one who is a member of any District Association.

I am merely hinting at the possibilities that whole-hearted co-operation could bring about, and if only a dozen of the largest planting Companies and Syndicates in India were to lead the way by jointly tackling the question, individuals would soon learn the value of following a really powerful lead.

There is one very sad note in Mr. Martin's letter. It is almost inconceivable that a Vice-Chairman of a United Planters' Association should advocate that each District should work on its own in "certain eventualities" which would affect the planting industry of Southern India as a whole, and at the same time pour out his wrath on the Anamalai Planters' Association for pointing out that they will be compelled (and I am sure it will be with very great reluctance) to work on their own, and to cease from supporting the U. P. A. S. I. if no united action is evolved by the parent Association, in dealing with the one question which each succeeding book of its proceedings has affirmed to be the most important one that it has to deal with.

The most perfectly arranged attractions to labour will not check questionable methods of recruiting, on the other hand it will compel the professional recruiter to redouble his efforts and to paint his fairy tales of lands flowing with milk and honey in still more glowing phrases.

There is not much consolation in pointing out that the Madras Government have expressed their satisfaction with present conditions, and to couple the Kanan Davan Planters' Association with its satisfaction, but it is indeed a strange coalition when one remembers that the Madras Government's reply was given to Mr. Martin's strong protest against the want of protection and fatherly supervision over coolies going out of India for work overseas, enticed away from their villages by false promises of high wages which the recruiter knew could not be fulfilled once the coolie was entrapped.

The fault lies in the fact that there are too many shallow "lone furrows" as regards labour. Converge them to one point and the problem will cease to trouble.

(Signed) C. H. Brock,
Chairman,
Anamalai Planters' Association.

Valparai, 18th January 1912.

Advices from Santos indicate that even there responsible interests are viewing the present blind manipulation with growing distrust. It is stated that the Sao Paulo Government is trying to curb the extravagant bull campaign by demands for a clearing-house for the prompt settlement of differences, of increased foot margins and for sworn brokers bound to responsible trading through the deposit of a large guarantee in cash or liquid assets.

THE PLANTERS' ASSOCIATION OF CEYLON.

COMMITTEE MEETING.

The following are extracts from the minutes of proceedings of a meeting of the Committee of the Planters' Association of Ceylon, held at Kandy on January 12th.

PROPOSED AGRICULTURAL DEPARTMENT.—Read letter dated October 20th, 1911, addressed by the Hon'ble Mr. E. Rosling to the Under Secretary of State for the Colonies, expressing on behalf of the Planters' Association the disappointment felt that no appointment to the Directorship of the new Agricultural Department had been made and placing before him the views held by the planting community with reference to the importance to the colony of such a department being efficiently directed and organised by the selection as its head of one who, whilst scientifically trained, has expert knowledge of tropical agriculture and its problems.

It was intimated that no information had been received to-date by the Planters' Association from Government of an appointment having been made.

LABOUR AND COAST AGENCY.—The Chairman put before the committee the circumstances leading up to and preceding the informal conference held in Colombo on December 20th between representatives of the principal estate agency firms and of the Coast Agency Committee to consider Mr. Rowsell's report submitting schemes for the extension of the present Labour Commission on the lines of providing for direct European supervision of kanganies recruiting labour for Ceylon, together with estimates of cost.

The following Resolutions were unanimously passed at that informal meeting:—

"That a European Assistant Commissioner be appointed to operate the lines of proposed Scheme No. 1 in a defined area and that for this purpose a sum, not exceeding Rs.40,000, shall be expended as considered advisable by the Coast Agency Committee.

"That this meeting agree to recommend to their principals (A) that all Superintendents of estates shall be instructed to keep or check all labourers' coast advance accounts and that no portion of the monthly balances of pay be recovered against such advances.

"That newly recruited labourers be landed on estate free of all debt other than for cach actually paid to them."

Resolution No. 1 had been submitted to a meeting of the Coast Agency Committee held that morning but had not been approved by that body as the majority of the members present expressed the opinion that, until reforms in Ceylon had been made effective in the shape of landing newly recruited coolies on estates free of debt and of protecting them after arrival by Superintendents keeping their accounts, no extension of the Labour Commission on the lines indicated would be of any material assistance in recruiting.

Disappointment was expressed by Messrs. R. F. S. Hardie, F. M. Mackwood and other members of the Committee at the decision of the Coast Agency Committee.

The Committee then considered the Report of the Coast Agency Committee which had been received at last meeting and circulated to all members of the Association. After a long and full discussion the following clauses (*inter alia*) were adopted, as amended, by the Meeting with the addition of No. 7 and 8.

(1.) "That the employment of the Professional recruiter has done, and is doing, great harm to Ceylon, and that he must be done away with at all costs.

(2.) "That the amount to be issued to newly recruited coolies on the A form, Ceylon Labour Commission be limited to Rs.15.

(3.) "That kanganies or coolies bringing new labour from India should receive remuneration in the form of a bonus per head on coolies brought to estates.

(4.) That it is absolutely necessary that all new labourers from India should be landed on estates free of any charge to them, other than for cash paid into their hands in accordance with instructions on the A form.

(5.) "That the keeping or checking of all coolies' advance accounts monthly by estate Superintendents is essential to the welfare of our labour force, and that to be effective it must be compulsory and embodied in a clause in the Labour Ordinance.

(6.) "That the importer of labour from India is prohibited by law from charging such labourers with any of the cost of importation, it is obvious that means must be devised to protect him from loss by the transference of his labour to another employer and that Government be asked to make it law that all discharge notes for labourers leaving the service of the importing employer at any time within three years of importation, to take service under another employer, shall bear a stamp value of Rs.25, such to be paid for by the new employer and refunded to the importing employer.

(7.) "That the provisions of the Labour Ordinance be made applicable to all employers of immigrant labourers.

(8.) "That clause 4 and 5 of Ordinance No. 9 of 1909 be amended making it obligatory for the employer to pay all monthly balances of wages in full to the labourer himself.

Resolved:—"That Messrs. Edgar Turner, H. A. Beachcroft, R. F. S. Hardie, the Hon. Mr. E. Rosling, and Chairman and Secretary, Planters' Association, be appointed a sub-committee to draft clauses, in conference with the Hon. the Attorney-General, amending the Labour Ordinances as required in accordance with the Report adopted to-day.

Read following letter from Ceylon Association in London:—

61, 62, Gracechurch Street, London, E.C.
November 16th, 1911.

To A. Wardrop, Esq.,
Secretary, P. A. of Ceylon, Kandy.

Dear Sir,

I am to inform you that at a meeting of the Tea and Produce Committee, held here yesterday, the following resolution was passed:—

"That the time has come to consider the matter of limiting the liability of immigrant coolies with a view to freeing them from debt;"

and "that Mr. Rosling be asked to bring the matter before the Ceylon Labour Federation and the Planters' Association of Ceylon."

Mr. Rosling was present at the meeting and took part in a long and interesting discussion on the subject of advances to coolies.

I am, dear Sir,
Yours faithfully,
(Sd.) WM. MARTIN LEAKE, *Secretary*,
Ceylon Association in London.

TEA.

Root Diseases of Tea.

Vol. V., No. 11, October, 1910, of Circulars and Agricultural Journal of the Royal Botanic Gardens, Ceylon, takes the form of a paper by Mr. T. Petch, B.A., B.Sc., which reads as follows:—

A circular on Root Disease of Tea (*Rosellinia*) was issued by the Royal Botanic Gardens in 1903 (Circular No. 6, Vol., 11). Since then it has been found that the facts there recorded refer to several root diseases, five of which have now been to some extent investigated. These diseases, in order of prevalence, are caused by *Ustulina zonata* Lev.; *Hymenochoete noxia* Berk.; *Poria hypolateritia* Berk; *Botryodiplodia theobromæ* Pat.; *Rosellinia bothrina* B. and Br.

The distinguishing marks of these five diseases are given in the following table. They may be divided into two classes, in one of which the mycelium is visible on the exterior of the root, while in the other the root appears quite clean. It is necessary, however, to point out that if the roots are wet and sodden when dug up these distinguishing features are not always immediately evident and that they are always clearer if the roots are allowed to dry for a day or two.

I. EXTERNAL MYCELIUM PRESENT ON THE ROOT—

(*a*) Mycelium tawny brown, cementing stones and sand to the root in a thick crust—*Hymenochoete noxia.*

(*b*) Mycelium red and white, in solid patches and strands closely adhering to the root—*Poria hypolateritia.*

(*c*) Mycelium at first cobwebby and gray, then forming black strands on the root; white stars between the wood and the cortex—*Rosellinia bothrina.*

II. NO EXTERNAL MYCELIUM—

(*a*) Mycelium running between the wood and the cortex in white fan-shaped patches—*Ustulina zonata.*

(*b*) No mycelium evident between the wood and the cortex; if kept in a few days the root is covered with a black powder—*Botrydiplodia theobromæ.*

It is probable that there are other root diseases of tea, in addition to the five mentioned above. For example, there has just been brought to my notice a case in which several bushes have been killed round a dying jak stump by a root disease which does not appear to be one of these five.

In pre-mycological days every dead bush was attributed to "wet feet" or "getting down to slab rock" and these ideas still persist in some quarters. The general tendency nowadays, however, is to attribute every dead bush to *Rosellinia*, and to take steps in accordance with that diagnosis. But *Rosellinia* is comparatively rare, and the treatment required for it is a waste of time in the case of some of the other root diseases. Moreover bushes may be killed by stem diseases, as well as root diseases, and it is again a waste of time to trench round a bush which is attacked by a stem disease spread only by spores.

The point last mentioned needs to be insisted upon. Unless a correct diagnosis of the disease precedes treatment, the correct treatment can only be hit upon by accident. The following instance serves to illustrate this. In 1905 a stem disease caused by *Aglaospora aculeata* was investigated on one estate, and it was found on another during investigation of the diseases

Since then only two cases have been sent in for examination, and under these circumstances it was decided that the disease was relatively rare. But the planter who brought forward the last case informs me that it is to be found on many estates in his district but that it is usually treated as *Rosellinia*. The disease is characterized by the gradual death of the bush branch by branch, the dead branches being covered with black thorns. There is no sign of disease on the root.

It is hoped that the present Circular will assist in the identification of our root diseases, and prevent mistakes similar to that referred to above.

It will no-doubt be thought incumbent on the writer of a Circular on tea root diseases to give some information whereby the planter may at once determine whether the bush has died from root disease, or leaf disease, or any other cause. Unfortunately no simple method of diagnosis is possible. It is not even possible to find characters which will serve to differentiate in all cases detween injuries caused by insects and those caused by fungi. Whenever a bush dies, root disease should be suspected, and the bush should be dug up, and the root examined to see whether it shows signs of decay or the presence of mycelium. Even then, if it shows either of the latter, nothing can be deduced unless the bush has been dug up as soon as it was dead.

If the bush suddenly dries up as though it had been scorched and dies with all its leaves still attached, it is almost certainly a case of root disease. If the leaves are shed gradually and the bush does not recover, root disease is again the most probable cause. But if, after the fall of the leaves, new shoots are produced, then root disease is improbable. Further, if the branches die, but new shoots are produced at the collar, the cause is in the stem, not in the root. Nor as a rule, is the root affected if the bush dies branch by branch.

Of course, bushes may die from other causes. Lightning is often responsible for the death of bushes, especially in the neighbourhood of large boulders. But in general the planter will not be far wrong in attributing his dead bushes to root disease. The details given above may assist towards a right interpretation, but they are not infallible rules.

HYMENOCHOETE NOXIA Berk.

This has already been described under the name of "Brown Root Disease" in circular No. 6, Vol. V. It is practically an omnivorous disease, and has been found in Ceylon to attack Hevea, cacao, tea, dadap Castilloa, Caravonica cotton, coca, Cinnamomum cassia, &c. In other countries it has been recorded on breadfruit trees and *Albizzia stipulata*, in addition to the species already mentioned, and the specimens on Funtumia have recently been received from the Gold Coast.

When attacked by this disease the roots of the tea bush are encrusted with a mass of sand, earth, and other stones to a thickness of 3 or 4 millimetres, the crust extending up the stem for 2 or 3 inches. I have been informed that because of this rough crust the disease is known as "sand-paper fungus" in the Federated Malay States. The mass of sand, &c., is cemented to the root by the mycelium of the fungus, which consists of tawny brown threads collected here and there into small sheets or nodules. In the early stages the predominating colour is brown and the name given to the disease then seems more or less appropriate; but as it grows older the fungus forms a black continuous coat over the brown masses of hyphae, and the diseased root then appears chiefly black. In all stages, however, the encrusting mass of stones and earth intermingled with brown threads serves to distinguish it.

If the bush is dug up as soon as it is dead, the wood of the root appears quite sound. If it is left for a long time in the ground, it ultimately acquires a honeycomb structure, the walls of the honeycomb being pale brown and hard, while the tissue enclosed in the cells is yellow and decayed. But it is not likely that this feature will be noticed unless the bush has been dead for a year or more.

The fructification of the fungus is rarely produced and I have never seen it on tea. It forms a thin dark brown crust adhering to the base of the stem. On examination with a lens this patch appears finely velvety, being covered with minute projecting bristles. These bristles, which are the characteristic feature of a *Hymenochoete*, are subcylindrical, and blunt or pointed at the apex; they project 30 to 100 above the surface, and measure to 6 to 10 in diameter.

The occurrence of this disease in old tea where no jungle stumps remain, would seem to point, in that case, to an infection by wind-blown spores. But according to our present knowledge, a further spread by means of spores from the bush first attacked cannot happen under ordinary conditions, because the fructification, if it is formed at all, is not produced until the bush has been dead for a very long time. If the dead bush is allowed to remain, the mycelium spreads along the roots to the roots of adjacent bushes which are in contact with them; but this is a slow process in this case and should not happen with ordinary care. In one instance the disease was definitely associated with decaying "na" stumps (*Musua ferrea*) which were at least 14 years old; the fungus had at first attacked the stumps, and had subsequently spread along the dead roots to the surrounding tea bushes.

Dead bushes should be dug up and burnt together with any neighbouring stump. As a rule, the whole of the fungus is removed with the dead bush; apparently it does not travel independently through the soil, but only in contact with roots or dead wood. The progress of the disease is slow and when a bush dies the fungus, as a rule, has not yet spread to adjacent bushes. Consequently it is rarely found that a neighbouring bush dies, after the first dead bush has been removed. But to make certain that the fungus is destroyed, it is advisable to fork in quicklime over the affected spot.

Photographs of "Brown Root Disease" on *Hevea* and *Brunfelsia* were reproduced in Circular No. 6, Vol. V.

PORIA HYPOLATERITIA Berk.

For a long time this disease was only known to occur in up-country districts above an elevation of 4,000 feet but with the recent extensions in tea it has been found to attack newly planted fields in the Kandy, Kegalla, and Kelani Valley districts, and also in the Southern Province. It is not, therefore, restricted to any particular elevation as was formerly supposed. It is chiefly a disease of new clearings, and it appears to be more prevalent on old chena land than on land which was virgin jungle. Several cases are on old coffee land.

The bushes attacked are usually from two to three years old. When dug up their roots are found to be mottled, red and white. They are really covered by a compact, rather thick mycelium, which is red externally and white internally; but as this is damaged in the process of extraction, it usually appears red and white. When the fungus is old, there may be black patches also. The mycelium generally forms a continuous sheet, but sometimes it runs in separate strands. It is not always easy to identify, especially by those unacquainted with fungus mycelia, because the red colour approximates to that of a healthy root. Occasionally a fructification may be present, even on very young plants.

When a young bush dies, the wood of the root shows very little sign of decay. On old tea, where the disease has existed for a longer time, or where the dead bushes have been allowed to remain, the wood becomes quite soft, with irregular red plates, somewhat gelatinous in texture, running through it.

The fructification is produced on the dead stem or on the surface of the soil round it. It is a white or pinkish plate, studded with minute holes, adhering closely to the stem or lying flat on the soil, or in some cases sharing both positions. Its thickness is only about one-sixth of an inch and it varies in diameter from 1 to 4 inches or more. It consists of a comparatively soft layer of short tubes seated on a red solid substratum. When it dries it curls away from the wood and displays the red under-surface. The edge of the developing fructification is white, but in full-grown specimens it is red and horny. The spores of the fungus are produced within the tubes.

This fungus undoubtedly spreads to the tea from dead stumps but it has not yet been determined what kind of stump affords it a starting point. It has been found on two different stumps, but in either case was an identification possible. In one instance it killed *Croton lacciferum* (Keppitiya, Sin.) but this had been attacked in the same manner as the tea by the spread of mycelium from some jungle stump. One correspondent states that the dead bushes occur round "Congli" stumps, which, I am informed, is *Doona zeylanica* Thw., but this scarcely fits in with the distribution of the disease. The majority of cases must originate on the stump of some tree which is common on chena land. The fungus is common in up-country jungles, but usually on decaying logs.

Once established, by means of wind-blown spores, on a dead stump, the fungus spreads through the soil and attacks the surrounding tea. The free strands of mycelium are white at first, but subsequently become thick cords with a tough red coat. Good instances of this power of running free through the soil have been afforded by growing the fungus from diseased tea roots in plant pots in the laboratory. In some cases the mycelium spread through the hole at the bottom and produced the fructification on the exterior of the pot.

In addition to digging up and burning dead bushes and any neighbouring jungle stump, the affected area must be surrounded by a trench about 1 foot in depth. The soil dug out must be thrown on the area enclosed by the trench, not among the healthy bushes. This area should be forked over with quicklime. Every effort should be made to get rid of this disease in the young clearings. In some instances it has proved exceedingly difficult to eradicate, and has taken an annual toll of the bushes for about seven years. In one case, in six-year-old tea, 2,200 dead bushes were removed in a year from a field of 26 acres.

It seems probable that this is the disease which originates on stumps of Bombu (*Symplocos spicata*) but I have not been able to determine this point.

ROSELLINIA BOTHRINA B. and Br.

This appears to be the least common of our tea root diseases. It occurs at all elevations from Peradeniya to Nuwara Eliya, but I have never seen a case in the low-country. I have found the fructifications (perithecia) in the jungle at Hakgala and have seen the mycelium running over the soil and killing off *Strobilanthes*. Several species of *Rosellinia* with the same habit occur in Ceylon but in all cases in which the fructification has been hatched from dead bushes the species concerned is *Rosellinia bothrina.* *Rosellinia radiciperda* Mass., to which the Ceylon disease was formerly attributed, is a New Zealand species which has not been found in Ceylon. In Southern India the destructive Rosellinia has been identified as *Rosellinia bunodes* B. and Br ; this species occurs in Ceylon but up to the present it has only been found as a saprophyte in rubbish heaps.

The most remarkable feature of *Rosellinia bothrina* is the extraordinarily rapid spread of its mycelium. To appreciate its powers fully one must see it at work in a Panax hedge ; in such a situation it will travel three or four yards in a few weeks. The mycelium consists of somewhat fleecy strands, white at first, then smoky-gray, and finally black. The change in colour may be observed by following the mycelium back to its starting point. The advancing, rapidly growing portion is white ; behind this comes a region where the growth in length has ceased and the mycelium is changing colour ; finally, towards the point of origin, the mycelium is mature and black and if on dead wood it may have begun to produce spores.

The mycelium travels in the top 2 or 3 inches of the soil. It prefers soil which contains a large percentage of dead leaves, &c., and if the ground is covered with a thick layer of dead leaves it usually runs along the surface of the soil under and among them. This point must be specially borne in mind in attempting to eradicate it.

It was formerly supposed that *Rosellinia* originated on *Grevillea* stumps, but further investigation has shown that the stump root which spreads from such stumps is rarely *Rosellinia.* I have seen it on a large *Grevillea* stump but in the light of subsequent discoveries its presence there can be explained in another way. I am of opinion that it usually begins in an accumulation of dead leaves ; at least that was true of three cases, where the attack has been watched from the beginning. In one case the leaves which had drifted into the base of a *Panax* hedge afforded it a footing. In another instance a mango tree was felled, and the log left lying in the tea ; in course of time dead leaves accumulated on one side of the log, and from these *Rosellinia* spread to the tea and the neighbouring *Panax* hedge. The spores which infected the heaps of dead leaves were no doubt carried by the wind from a patch of tea about 50 yards off, which has harboured *Rosellinia* for some time. It is most probable that in the case of the *Grevillea* noted above the fungus originated in the dead leaves around the base of the stump.

When the mycelium reaches a tea bush it travels down the root for a distance of about a foot. When the bush is first attacked the mycelium forms a loose cobwebby mass round the root and stretches across to the side roots in similar loose masses. This is well seen on young tea plants which die soon after they are attacked. On older bushes the mycelium soon forms black strands closely applied to the surface of the root. This difference may be in part a weather effect, the looser masses being formed in the wet weather ; but since the latter occur almost exclusively on young bushes the view that the difference depends on the resistance of the bush, *i.e.*, that it takes longer to kill a full-grown bush, is the more probable. From the apparent difference in the mycelia, it was previously supposed that there were two species of *Rosellinia* which attacked tea, but by developing the fructifications it has been proved that there is only one.

The mycelium on the exterior of the root penetrates the cortex and spreads out over the wood. At each point of entry it divides into a number of strands, which radiate over the surface of the wood and form a white star up to half an inch in diameter. These stars are readily seen if the cortex of the root of a tea bush is carefully taken off, and they afford the easiest means of identifying the disease. In the softer *Panax* roots they are not observable, because the root is soon reduced to a soft rotten mass.

With a microscope it is always possible to identify *Rosellinia* from mycelium alone. A fungus mycelium consists of a large number of very fine threads. As a rule these threads are cylindrical tubes of uniform diameter throughout their whole length, divided into sections by cross partitions at fairly regular intervals. There is not much scope for variety in such a structure and therefore most mycelia are practically identical. But in some species of *Rosellinia* the mycelium is different. Immediately in front of each cross partition the mycelium forms a pear-shaped swelling, so that it appears to be divided into sections, each of which has one end narrow and the other end inflated. As the narrow end of one section is united to the inflated end of the next, the structure reminds one of an old-fashioned condenser.

While the underground mycelium is killing the root, that at the surface grows up along the stem, where it forms a continuous sheet, purple-gray at first, and then black. This sheet usually extends all round the stem, and to a height of about 6 inches above the soil. Here the fungus passes through a stage which was entirely overlooked in the first investigation of *Rosellinia* in Ceylon. And as this is far the most important stage, this oversight may account for the lack of success in treating *Rosellinia*. Emphasis was laid on the fact that the fructification of *Rosellinia* was rarely found, and therefore its extension was brought about by the spread of its mycelium. But *Rosellinia bothrina* has at least two kinds of fructification, a conidial stage and a perithecial stage; and while the perithecia are rare and scarcely ever found on the tea bush in the field, the conidial stage occurs on every tea bush attacked. The spread of the fungus in any given patch is no doubt due to the extension of the mycelium, but its spread to other parts of the same field is brought about by the scattering of the conidia by the wind or by other means.

The conidia, the first kind of spore, are borne in short, erect, bristle-like stalks. These stalks are produced in clusters on the sheet of mycelium on the stem and as they arise close together the sheet becomes velvety in appearance. Each stalk divides into numerous branches at the apex, and these branches bear the conidia. The latter are white or grayish in mass, and form a white powder over the black mycelium; they are readily detached, and therefore can be blown away by the wind, or transferred from place to place on the clothing of coolies.

After the bush has been dead for a long time, the second form of fructification, the perithecia, is produced. These are minute black spherical bodies about one-tenth of an inch in diameter which contain the second type of spore in elongated sacks (asci). They occur clustered together on the sheet of mycelium on the stem among the old stalks which bore the consdia. A technical description of both stages has been published in the Annals of Peradeniya, Vol. IV. page 433. Practically these ascospores are a negligible quantity in dealing with the disease in tea, because the dead bushes are never left standing long enough to produce them.

A curious phenomenon, which for a long time was not attributed to *Rosellinia*, is sometimes seen on bushes which are attacked towards the close of the monsoon. The advancing mycelium surrounds the stem at the surface of the soil and kills off the bark all round for a length of 3 or 4 inches When fine weather ensues the youngest mycelium in the soil dies, and, provided that it has not got a sufficient hold of the bush to enable it to live there independently, the mycelium of the stem dies also. The bush is therefore girdled at the collar, but the fungus does not kill it The food elaborated by the leaves cannot pass down to the roots, but is arrested by the circle of dead bark, and consequently a swollen ring of tissue (callus) is formed round the stem above the dead patch, and a smaller ring below the latter. It is probable that the same result occurs when bushes in the early stages of the disease are pruned, owing to the removal of shade and the consequent action of sunlight on the mycelium. The appearance of these stems suggests that they have been gnawed all round by some animal; but this idea is disproved by the fact that the dead bark is intact while the occurrence on it of the typical hyphae of *Rosellinia* definitely indicates the cause.

In the treatment of *Rosellinia* two points must be borne in mind: first, that the disease may be conveyed to other spots by spores (conidia), which occur in abundance on every dead bush; and second, that the ground in and around the dead bushes is permeated by mycelium, which has without much doubt already advanced beyond the bushes which show signs of being affected.

In order to prevent the dissemination of spores during the uprooting and removal of dead bushes, straw should first of all be heaped round the main stem and over the lower branches and set on fire, so as to destroy these spores as far as possible. If this is not done the spores in the main stem will be scattered when the bush is pulled up, and will also be conveyed elsewhere on the clothes and feet of the coolies as well as on the tools. After this scorching the dead bushes must be dug up and burnt. Burning must be done on the spot if possible—it is always possible if three or four bushes have been killed—and it is cheaper in the end to spend a little on kerosene than to wait weeks for the bushes to dry. During the drying period they will most probably hatch out millions of spores.

To prevent further spread of the mycelium, a trench a foot in depth must be dug round the affected spot. It should be dug so as to surround not only the dead or dying bushes but also a complete ring of apparently healthy bushes. There is no doubt that some of the surrounding bushes will already have been attacked, even though they do not show any signs of it. The living bushes enclosed by the trench should be heavily pruned, as well as a circle of bushes immediately surrounding the trench. This pruning will let in sunlight to kill the mycelium which may just have reached these bushes. Before the trench is dug, all dead leaves and prunings must be racked into the centre and burnt with the dead bushes. In dealing with *Rosellinia* the surface of the ground must be made as a tennis court. A layer of dead leaves and twigs will protect the mycelium and provide it with food, and thus neutralize all attempts to get rid of it. After the trench is dug, it must be periodically inspected and cleaned out; if it is allowed to fill up with dead leaves it is worse than useless.

Needless to say, prunings must be buried in fields attacked by *Rosellinia*; they are just what the fungus requires. Nor can any green manure plant be grown on or round the affected patches.

When all the above details have been attended to, lime should be forked in over the affected patch and scattered in the trench. Quicklime is best for forking in the bare soil, but slaked lime should be scattered over the stems of the pruned bushes.

The objects of the treatment are (1) to kill the spores on the dead bushes by scorching (2) to prevent the spread of mycelium by trenching (3) to kill the mycelium by exposure to sunlight and the action of lime. The order of procedure should be (1) scorch the dead bushes (2) dig them up (3) prune the surrounding bushes (4) rake in all dead leaves, etc., from among the pruned bushes (5) burn the prunings, dead bushes, leaves, etc., (6) dig the trench, taking care to throw the excavated soil within the affected area (6) apply lime.

It is better to have the work done thoroughly, and watch it being done, than to entrust it entirely to coolies, and consequently have to repeat the process periodically. The cooly no more understands why he is doing it than he understands why drinking water should be boiled or filtered; and if left alone he will simply throw the diseased roots among the surrounding tea.

It is almost impossible to eradicate *Rosellinia* under dense shade, unless one is prepared to dig out and cart away the top 12 inches of soil. All shade should be removed as much as possible.

In addition to tea, *Panax* and *Strobilanthes*, *Rosellinia bothrina* kills off camphor. It has been found once on dadap, but this had been attacked together with the tea by the advancing mycelium. It does not attack cacao or *Hevea*; at least plants of both species in a *Rosellinia* patch have not been affected. It is probable that the extermination of coffee was in part due to *Rosellinia*, judging from the reminiscences of old colonists. One writer in the *Ceylon Observer* during recent years related how he first became acquainted with Coffee disease: another planter took him out into the field, pulled up a bush, and showed him the mycelium on the root. Of course this could have had no relation to the coffee leaf disease, and the only mycelium likely to have attracted attention is that of *Rosellinia.*

It is a waste of time to re-plant patches infected with *Rosellinia* within eighteen months of its occurrence.

USTULINA ZONATA Lev.

This is the commonest tea root disease in Ceylon and it is in a great measure preventible. Its prevalence is due to the practice of growing *Grevillea* among tea and cutting it out either for firewood or when it has grown too big. It is not uncommon to see three or four dead tea bushes round each *Grevillea* stump over a large area. During the last two or three years another similar source of infection has arisen in certain districts. *Albizzia moluccana* has been planted through tea, and in many cases it has been allowed to grow to an enormous size. Recently quite an epidemic of *Albizzia* felling has occurred, and the dead stumps are already giving trouble by serving as a starting point for *Ustulina zonata*, as well as for another tea root disease caused by *Botryodiplodia theobromæ.*

The decay of stumps is always brought about by the action of fungi, the spores of which alight upon the exposed wood. In the case of *Grevillea* stumps in tea, the commonest fungus which attacks them is *Ustulina zonata.* The spores are blown by the wind on to the exposed wood, and when they germinate the mycelium grows down in the stump and destroys it. From the stem it travels outward in the lateral roots and if any tea roots happen to be in contact with them, as is usually the case, it spreads from the *Grevillea* root to the tea root. I have never seen a tea bush attacked from above, *i.e.*, through the exposed wood at the top of the stem, by means of spores, but always through the root. It is possible, however, that infection from the top may occur.

When the disease is first noticed, the *Grevillea* stump is usually in the last stages of decay, and two or three of the surrounding bushes are dead.

The fructification of the fungus is then well developed at the base of the *Grevillea* stump, and is extruding spores which will infect others. As a rule, the bushes die gradually, that is, their leaves fall off and no new shoots are produced, but sometimes they dry up suddenly with all their leaves attached.

The dead tea roots do not show any external mycelium. There are a few small black spots here and there, but these are not conspicuous; they mark places where the internal mycelium has emerged through the cortex to form a fructification but has stopped because it was not above ground. If the cortex is removed, white fan-shaped patches of mycelium are found over-lying the wood; these are frequently fused into a continuous sheet but in all cases the fan structure is fairly evident. When the mycelium meets a crack in the cortex, and is thereby exposed, it acquires a black edge.

The fructification is produced in abundance on the dead *Grevillea* stumps, and occurs also at the collar on dead tea bushes, if these are left standing long enough. The mycelium emerges through the bark and spreads out over the surface of the stem, forming a white plate up to 2 inches in diameter and about one-tenth of an inch thick. The growth of this plate is arrested in dry weather and hence it becomes concentrically furrowed, each furrow making a temporary stoppage of growth. Frequently several plates arise close together and form a continuous sheet. On the surface of these white plates, conidia, *i.e.*, free spores, are produced. In these stages the plate is soft, but when the conidia have been shed, it changes completely in colour and consistency. It becomes purple-gray dotted with black spots, and hard and brittle. When old it may turn quite black. The black spots are the openings of a series of chambers, in each of which the second kind of spore, the ascospores are produced. As in the case of *Rosellinia*, the fungus have two kinds of spores; one produced in sacks (asci) and the other at the apices of stalks; but in this case the stalks are so closely packed together that the white surface is smooth.

The above descriptions refer to the typical form of the fungus, but in reality *Ustulina zonata* is one of the most protean of our fungi. The plates are frequently undulating and thrown into contorted swellings, especially when they grow over the loose bark and earth at the base of a *Grevillea* stump. Sometimes they are stalked, instead of laying flat on the stem, and frequently a number of stalks arise close together, each bearing a small plate at its apex. In sheltered situations the upper surface may remain permanently white even in the second stage. When these stalked forms are in the conidial stage, they are sometimes indistinguishable from a *Xylaria*, and hence this disease was attributed to *Xylaria* when first found (Report of the Mycologist for 1905).

Ustulina zonata attacks pumelo (*Citrus decumana*) as well as *Grevillea* and *Albizzia* stumps and tea. Another tree in the Botanic Gardens, Peradeniya, has been attacked, but its name is not known. The fungus is quite common in up-country jungles, and probably kills many of our native trees. That its spores germinate readily on dead wood was demonstrated when the fructification was grown from diseased tea roots on the laboratory verandah; the spores were somehow conveyed to various other cultivation, all of which developed *Ustulina zonata*. Among these was a section of cocoanut stem, on which it grows vigorously. From this last occurrence it is probable that *Ustulina* may at some future date be found to cause root disease in cocoanut as well as in tea. Indeed, when *Ustulina zonata* was first discovered in India some seventy years ago, it was found on cocoanut; but whether it was parasitic or not history does not relate.

Ustulina zonata has been found on an old *Hevea* which had died of root disease, and apparently the disease was caused by its fungus. The evidence is rather doubtful, as the base of the tree was in an advanced stage of decay but the fructification occurred on the dead wood. The tree had been planted in tea, and the latter had been abandoned. This is a solitary instance, but it should serve to demonstrate that when tea under *Hevea* is abandoned it should be up-rooted. The point is still further emphasized by the next disease caused by *Botryodiplodia theobromæ.*

As in other cases of root disease, the dead bushes and the stump from which the fungus spread must be dug up and burnt. There is no free mycelium in the soil, and therefore trenching round the affected area might possibly be dispensed with. But it is best to err on the safe side and to trench. The bare soil should be forked over with lime.

But the chief measures called for in this case are preventive measures. So long as *Grevillea* and *Albizzia* are cut down, this disease is certain to occur. Therefore if it is desired to avoid it, the present practice must be altered. On some estates it has been found possible to pollard the *Grevilleas* at a height of 10 feet or so without killing them. In other districts they are said to die after such treatment, and in that case they should be uprooted instead of being pollarded or felled. Most of them do not exceed 8 inches in diameter and therefore up-rooting should not be difficult. If this cannot be done the tree should be felled by laying bare the roots, cutting through the side roots, and then cutting through the tap root about a foot above the surface. This would leave the "stump" a foot below ground, where it would be less liable to cause disease than the usual stump one foot above ground. The method requires more labour, but not so much as the treatment for root disease which follows the usual practice of felling.

With *Albizzias* the conditions are different, and a practical solution of the difficulty cannot at present be suggested. As a rule, they do not endure pollarding; when young *Albizzias* are pollarded they are frequently killed back by *Botryodiplodia theobromæ* and become centres of this latter root disease. And it seems out of the question to think of extracting the huge stumps of the old *Albizzias* which are now to be found in tea. One can only suggest that when old *Albizzias* are felled a trench should be dug round the stump cutting through all the lateral roots. This might prevent the subsequent spread of *Ustulina* to the tea roots. If it is desired to get rid of young *Albizzias* they should be uprooted, whether among tea or Hevea.

BOTRYODIPLODIA THEOBROMÆ Pat.

The most usual of this disease is the death of the bushes after pruning' The bushes appear healthy, but when they are pruned, they die. The disease is one of comparatively recent date as far as our records go, but the number of cases is steadily increasing, and, as a rule, the number of bushes killed in each case is greater than in any other tea root disease. Patches of from forty to one hundred dead bushes are not uncommon, and I have seen more than 10 per cent. of the bushes killed over an area of 15 acres, leaving large bare spaces. Several correspondents estimate their loss at 25 to 50 per cent. over some fields. The time from pruning at which the dead bushes are found varies from six weeks to three months; in one instance the bushes reached the tipping stage and then died back. It appears to be chiefly a low-country disease, though cases have occurred at an elevation of 2,000 feet.

There is no external mycelium on the root, not any mycelium between the wood and the bark visible to the naked eye. The bark is blackened throughout, the wood is also blackened, and the cambium layer is blackish brown. All this discolouration is produced by the mycelium of the fungus, but it runs within the cells of the wood and bark, and therefore can only be seen in sections under the microscope.

The fructifications consist of minute black spherical bodies embedded in the bark. They are not visible from the exterior, but if the bark is lightly shaved, they may be seen as minute black circles with a white centre. Each sphere contains a number of spores which are white in mass when immature, but black when ripe. These spores are extruded in large numbers when the root dries, and if it is kept for three or four days the root is covered with a black powder. Sometimes the immature spores are extruded and the powder is then white. The spores are oval, and divided into two parts by a wall across the middle—the typical *Diplodia* spore.

When the bushes die the roots are completely filled with the mycelium of the fungus, although only a short time may have elapsed since the pruning. This would seem to indicate that they were attacked before they were pruned, and several observations support this view. The course of the disease appears to be as follows. The fungus attacks the smaller roots, or some of them, and grows up into the main root along the central older wood. As long as it is confined to the centre of the root and stem the bush is able to survive, because it can obtain enough water through the outer layers of wood. But when the bush is pruned and the quantity of moisture in the outer layers entirely changed, the fungus spreads outwards and stops the supply of water altogether, thus killing the bush.

Recent investigators have shown that the preference of a fungus for particular kinds of wood is sometimes due to the relative amounts of air and water which the wood contains. There is, therefore, nothing inherently improbable in the supposition that in the present case the fungus is confined to the central wood until the bush is pruned. A similar instance may be referred to here, though it has no connection with this disease, as far as is known at present. On one estate in Ceylon bushes which are apparently healthy develop a white mycelium on the ends of the branches when pruned, the patch of mycelium appearing in the middle of the pruning cut. A microscopic examination shows that this mycelium runs the whole length of the branches, and is continued also into the main stem and down one or more of the lateral roots. But wherever it is found it is confined to the central wood, and does not affect the outer younger layers. The identity of this fungus has not yet been ascertained. Apparently it does not kill the bush.

Botryodiplodia theobromæ is a very common fungus; and in cases where it is known to cause damage to other plants, *e.g.*, *Castiloa*, *Hevea*, and *cacao*, it is usually a wound parasite only. In cases of tea root disease caused by it there are two main sources of infection, *viz.*, buried prunings and dead *Albizzias*. The fungus grows vigorously on dead *Albizzias* especially after they have been girdled, and it often kills back young *Albizzias* after they have pollarded. In one case fifty young tea bushes died round an *Albizzia* only 3 inches in diameter, which had died back after pollarding. How the tea bushes are attacked is not exactly known. In all probability the fungus can live in the soil. It kills young *Hevea* (see circular No. 23, Vol. IV.,) even the basket plants, by attacking the roots, and there seems no other explanation of that except that it is a soil fungus. It grows also on tea prunings and it is most probable that the regular burial of prunings leads to an accumulation of the fungus in the soil. The roots of the tea bush grow towards the masses of buried prunings because the soil is damper there, and therefore infection can readily occur.

Some of the examples of old tea bushes killed by *Botryodiplodia* indicates that the progress of the disease on old bushes is slow. Many of them are completely hollowed out by white ants, not *Calotermes militaris*, but the common species which eat decaying wood. This shows that the centre of the stem has been attacked by the fungus a considerable time before. But, as a rule, even these hollow bushes do not die until they are pruned. If the progress of the disease is as slow as it appears to be, it is all the more dangerous, because a large number of bushes may be attacked before any show signs of disease.

The dead bushes should be up-rooted and burnt as soon as possible. If they are allowed to dry they develop myriads of spores, and they should therefore be burnt with the help of kerosene. Any prunings lying about the affected patches should be raked up and burnt at the same time. The affected soil should be forked over with quicklime. Watering the soil with a 2 per cent. solution of iron sulphate (ferrous sulphate) was recommended in the case of a similar disease in India several years ago, but no details of the treatment have since been published, and it is not known whether any success attended it. As the soil must be thoroughly wet, the cost of applying it on the average tea estate would probably be found prohibitive. The affected soil might be dressed with powdered iron sulphate.

The burial of prunings should, of course, be stopped in affected fields, even if it does upset the manuring programme.

Since *Botryodiplodia theobromæ* attacks *Hevea* under certain circumstances, *e.g.*, in die-back, abandoned tea under *Hevea* should be uprooted, not left to die out. The same should be done with young *Albizzias* interplanted among *Hevea*, when they begin to suffer from the effects of the *Hevea* shade.

In the case of a similar, probably the same, disease in India infection was thought to be conveyed by the seed, though no evidence in support of that view was brought forward. Where young plants have been attacked in Ceylon, seed from various sources has been used, but the majority of cases are in old tea, where the "jât" of seed cannot now have any influence in this respect.

COFFEA ROBUSTA IN JAVA.

Mr. M. M. Saleeby, fibre expert of the Bureau of Agriculture, Philippine Islands, has made an original investigation of agricultural conditions in Java. He returned to Manila on August 25, and the *Philippine Agricultural Review* for December publishes the following:—

"In summing up the coffee situation, Mr. Saleeby says that the cultivation of the Robusta species is increasing at the expense of the Java and the Liberian. The Java and Liberian coffees are liable at any time to be completely destroyed by diseases against which all efforts have proved futile. So far no serious diseases have attacked the Robusta variety although probably as it becomes more widely cultivated some disease will develop. However, Robusta coffee is only planted as a catch crop with rubber or other staple crops, which insures the planter against over-production and materially reduces the cost of bringing the rubber to bearing.

"The Robusta begins bearing from the second year up, insuring a good crop from about the third year. In East Java, where the plant grows best, several plantations have announced a crop of 28½ piculs per hectare. The average yield on the estates visited was 7 piculs per hectare, for plants between three and four years old."

RUBBER.

Cultivation of "Hevea" in Brazil.

One of the most interesting chapters of the report issued by the Turin Exposition on the State of Pará is that dealing with the measures which have been taken for the development of *Hevea* culture in that State.

While excellent lands are available, of a character appropriate to the proposed cultivation, it is necessary to obtain the co-operation of the Government, in the form of such concessions as would attract capital. Other points calling for like attention were the scarcity of labour as well as the high cost of transpotation.

By the State enactments of November 5 and 6, 1909, guarantees were conceded of interest, premiums and other favours to national and foreign companies, or even to individual agriculturists, having in view the cultivation of *Hevea brasiliensis* or Cacao within the territory of the State.

In consequence of this legislation some grave obstacles were partly removed. Among the steps taken by the State Government was the establishment of experimental fields intended for promoting the cultivation of *Hevea* and Cacao at its agronomical stations of Igarape, Assu (a short distance from the Braganza railroad) and of Belem; with a view to giving practical instruction to new planters. The results of these official plantations are said to have been worthy of commendation.

At the orphan Institute of Santo Antonio do Prata there is a plantation of *Heveas* in blossom and of Cacao, in a lofty and sandy location. This plantation the Government intends to bring up to 100,000 trees of one or other species.

Subsequently to the promulgation of the laws of November, 1909, and up to December 26th, 1910, applications had been received from 42 agriculturists desirous of being inscribed as competitors for premiums, and intending to plant about seven million *Heveas* as well as two million cacao plants. The proportion of the above, representing foreign capital, was about two million *Heveas* and a nearly equal number of cacao plants.

Two Companies, desirous of availing themselves of the privileges granted by the enactments referred to, proposed to cultivate a total area of 50,000 acres granted free on the terms of the statute; each company agreeing to plant 20,000 trees annually. The plantations were to be situated: the first in the Lower Amazon territory and the second on lands between the River Guama and the Prata Institute (already referred to).

The co-operation of the National Government has been the subject of a project submitted to the Federal Chamber of Deputies by the representatives of the State of Pará for promoting the cultivation of *Hevea brasiliensis* and cereals in Amazonia, their natural *habitat*.

In conclusion, the report states: "Amazonia is the best region in the world for the extensive and profitable cultivation of *Hevea* and Cacao. No other country is in a position to compete with it as to fertility of soil, favourable conditions of climate for this description of culture, potentiality of production and the quality of products. . . . . . Predominance in rubber production will belong to Amazonia in the same way as that of Coffee does to Sao Paulo."

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The Scientific Officer.

Mr. R. D. Anstead, B.A., returned on the 30th ultimo from the brief tour on the Anamalais referred to in issue of the 20th instant (*P.C.*, Vol. VII, No. 3, p. 33.)

China Tea.

Mr. J. A. Richardson has sent out from Home a letter and a pamphlet received by him lately, and he observes that communications of the same kind "are being sown broadcast through the country." He suggests passing the papers on to the Indian Tea Association and writes:—"I really think it is high time Southern India did something to counteract the very strong campaign which is being carried on to induce people to drink China Tea in preference to Indian and Ceylon. There is scarcely a tea room or café of any standing in London, Edinburgh or any large towns where you are not asked whether you will have China tea. Whether the particular article supplied is China tea or not is a doubtful point. However, the fact remains that there is a very strong organization backing up the movement, and I think it was high time that something was done to counteract it."

The letter referred to by Mr. Richardson is from a firm of "wholesale tea, coffee and cocoa merchants" in London and reads as follows:—

"In all articles of diet, *especially in the case of those in delicate health*, only one quality can be considered *the best*, and as Tea occupies a position of the greatest importance in every Household we ask you to make a trial of the enclosed sample of . . . *China Tea.*

"Our speciality is, without question, from a health point of view, the premier Tea on the Market, being the leading Brand of China Tea, the advantages of which, as such, over ordinary Indian and Ceylon Tea, are emphasized both in the Press and in practice by the leading lights of the medical profession, a fact which we do not doubt your own Doctor will confirm.

"The enclosed booklet will give you full particulars, and we trust you will soon become a regular user of . . . China Tea to the benefit of the health of your Household."

As regards the Pamphlet it is only necessary to quote a short paragraph from the first page: "China Tea the Best—Much has been written of late on the Analysis of Tea, but after all the stomach is the best laboratory, and it is proved that a Tea containing the least Tannin is the best. The *Lancet* has shown this conclusively."

This last assertion is particularly misleading.

Notes and Comments by the Scientific Officer.

148. *Green Manures for Tea.*—In this number of the *Chronicle* will be found some extracts from a most interesting lecture by Mr. Kelway Bamber dealing at some length with the subject of green manures for Tea. It may be well to remind Tea planters of what has been done in this country in the way of experimenting with green manures for Tea, little as it is.

Tephrosia candida, recommended by Mr. Bamber, does not appear to grow well here in most places but *Tephrosia purpurea*, a very similar plant to look at, and in its habit of growth, grows readily, as does also *Tephrosia tinctoria*, which is a common local weed. This latter was experimented with on a large scale in the Wynaad and an account of it will be found in Vol. V, p. 487. Unfortunately, owing to change of managership and policy, this valuable experiment has been abandoned, I believe Particulars of the yield and an analysis of the plant were published on p, 542 of Vol. VI, from which it will be seen that 7·5 tons of material containing 262 lbs. of Nitrogen were obtained per acre. The ash contains 20·37% Lime, 16·45% Potash, and 7·76% Phosphoric acid, figures very similar to those given by Mr. Bamber for *Tephrosia candida*, the Potash content being smaller. In the experiment quoted above it was intended to manure the Tea with a mixture of Basic Slag and Sulphate of Potash to supply this drain on the soil, but it must be remembered that these food materials are only temporarily removed and are returned to the soil when the green manure rots down. I strongly advise all Tea planters to continue this experiment and take Mr. Bamber's advice.

149. *Soy Bean.*—Enquiries are often made at this office as to whether there are any recorded results of experiments with Soy Bean in India. *The Report on the Agricultural Stations in the Central Provinces and Berar* for the year 1910-1911, which has just come to hand, contains a few notes on the subject. These show that Soy Bean will grow readily and give a good yield, but a variety of low oil content has hitherto been experimented with. At the Agricultural Station, Powarkhera, it is reported that, "A small seeded Japanese variety which had been acclimatised at Nagpur was grown on about ¼ acre morand soil. The crop is very hardy and grew splendidly, giving a yield of above 800 lbs. beans per acre. The seed was analysed by the Agricultural Chemist and gave a very disappointing oil percentage, *viz.*, 10%. This variety is evidently more suited for forage purposes, and some new varieties which have been obtained from Manchuria this year by the courtesy of Messrs. Ralli Bros. will be tried this year." The Nagpur College Farm report, "The farm variety introduced in 1882 was grown on an extended scale this year with and without superphosphate; 10 acres were sown. The land chosen was a field which previously had grown wheat or gram, a low lying heavy rabi field. The outturn was 660 lbs. per acre over the whole area. This variety is a small seeded late one. The percentage of oil is only 13, too low for commercial purposes. It contains a high percentage of proteid and should be a good stock food. It may be regarded as a fodder variety. Some 15 new varieties were tried this year and it is hoped a number of new imported ones will be available for trial in 1911-12. Some of the varieties tried look as if they might be promising." Finally the Agricultural Chemist, Central Provinces, says: "The Soy Bean cultivated for many years on all the farms of the Department contains a very low proportion of oil and cannot be regarded as an oil yielder."

RUDOLPH D. ANSTEAD,
Planting Expert.

DISTRICT PLANTERS' ASSOCIATIONS.

Wynaad Planters' Association.

Proceedings of Annual General Meeting held at Meppadi Club on January 24th, 1912.

PRESENT.—Messrs. Atzenwiler, Bownass, Darkin, Gillatt, Malcolm, Powell, and Stewart, Waddington, J. Carson Parker (by proxy) and C. E. Abbott (Honorary Secretary); Visitor: Mr. Egan, Mr. Waddington in the Chair.

1741. *The Proceedings of last Meeting* were confirmed.

1742. *Mr. West's case against Shengalli.*—(Referring to para 1728). Read letter from Mr. West, who was unable to be present. It was decided to postpone the matter, as he says he has other cases to bring forward.

1743. *The Annual Report.*—The Hon. Secretary read the Annual Report.

ANNUAL REPORT.

There have been 8 General Meetings held during the year, which have been well attended. 10 new members have joined the Association, and 11 have resigned.

Rules and Membership.—It has been intended at more than one meeting to discuss this question; but it has always been shelved to make way for more pressing business. It is hoped that time will be found before long to get the matter settled.

A resolution will be proposed later on with a view of temporarily bridging over the difficulty.

Roads.—The only serious complaint brought forward this year has been about the road from the Mysore Frontier to Maddur, which got into a very bad condition. The Chief Engineer of the Mysore State informed the Association that an estimate had been sanctioned, and that every effort would be made to put things in order.

Mr. Blake, the District Board Engineer of Malabar, had been present at two meetings of the Association. So we have been able to discuss local requirements with him. This has been a distinct advantage. The reduction in the Provincial Grant has threatened to dislocate the finances of the Malabar District Board. It is hoped that sufficient funds will be provided to keep the principal roads in good order.

Town Nuisance Act.—We asked to have this applied to Meppadi. The matter has not been settled yet.

Bonus on Green Tea.—The U. P. A. S. I. has renewed its request to have a bonus of 6 pies per lb. paid by the Indian Tea Cess Committee on 4 million lbs. of tea to be exported from South India.

Our Representative on the Cess Committee, Mr. J. Carson Parker, will shortly have an opportunity of putting our wishes before the Committee in Calcutta, and we hope that our request, which seems a reasonable one, will be agreed to.

Labour Recruiting and Emigration.—I imagine that, in spite of the rate of pay in the District having been raised, there are few if any of us in Wynaad who can say that we have had all the coolies we wanted throughout the year. Though a considerable improvement has taken place recently, and much enterprise has been shown in opening new recruiting Districts, we cannot be sure that the condition of affairs will be permanently better until we have been through the hot weather.

The matter is recognised as being of the first importance and was fully discussed at Bangalore.

There were two main proposals put forward by way of remedies for our troubles. The Anamalai Association pinned its faith to persuading Government to take up Mr. Brock's registration scheme or something similar. Its members are willing to face the cost of carrying out registration. I do not know if the estimate is an official one, but Rs.50,000 a year was mentioned at Bangalore as the sum that would have to be provided by the planters of Southern India. It was said truly enough that Rs.50,000 was a trifle compared to what it costs to raise coolies' pay 1 anna. Any one who cares to work out his last year's expenditure and calculate what went in extra pay can see that for himself. But would registration prevent pay being raised?

Mr. Danvers summed up the objection to the registration scheme in one sentence. We may register coolies as much as we please, but we will not get them to work for 4 annas when they can get 6 annas next door.

Any such scheme would require legislation of a kind that we are not likely to get passed, and I understand from a letter I received a day or two ago from the Chairman of the Anamalai Planters' Association that they are not now anxious for legislation but for combination among planters to prevent ruinous competition among ourselves and to spend the money so saved on fighting outside competitors and unfair methods of recruiting. It is hoped that some agreement may be arrived at as to what are the best means of effecting these highly desirable objects.

This Association has decided to support Mr. Martin's proposal, which takes the line that our only chance is to help ourselves. He declares that the whole trouble arises from competition by Emigration Agents in a few Districts.

We ought to try to prove to coolies that they will be better off in Indian Planting Districts than abroad. We can also fight against unfair recruiting for emigration.

Mr. Martin pointed out that Government helped in every way people who came to India in search of labour, but they will not help the planters in India.

I was called to order in the Legislative Council for saying that while the Madras Government insisted on a cooly recruited for an Indian Planting District being taken before a Magistrate to make sure that he understood the terms he was engaged on and had really received the money that was entered in his contract, the only thing they cared about when the cooly emigrated was that he did not carry the plague with him.

I had a conversation with the Ceylon Commissioners, Messrs. Coles and Drummond Hay, when I was in Bangalore. They were too late for the Meeting and appeared to think that the U. P. A. S. I. wanted to stop emigration. With their experience of the Ceylon Government's attitude towards Planters they perhaps thought that we would be listened to if we put forward such a proposal.

Ceylon planters have been recruiting labour for the last 70 years in Southern India quite peaceably side by side with Indian planters, It is only the the reckless way that money has been thrown about of late, and the rascality of the Native Recruiter that has caused any friction. It looks as if the Ceylon planters are tired both of wasting money and of the ways of the Recruiter.

You will have noticed that other Districts are taking up Mr. Martin's scheme, and I hope we shall do the same.

Thefts of Produce.—The Madras Government was asked to legislate on the lines of the Coffee Stealing Act to protect tea, pepper and rubber, and has refused, though the Travancore Government intends to pass a law to protect Rubber. We have heard of several cases of theft during the year and there is an uneasy feeling that there is a great deal of roubery going on from our factories. I suggested in my last Annual Report that it might be worth while to establish a "Reward Fund" for the detection of these cases.

Planters' Benevolent Fund.—Some of those who subscribed last year to this Fund have left the District, and others may have paid their subscriptions direct to Mr. Ormerod. I have only forwarded two subscriptions. This Fund has not received as much support as it deserves in Wynaad.

I think these are the only subjects I need specially allude to.

I have now to ask you to pass the Accounts, if they are found in order, and to place my resignation in your hands. I first took up this work in 1903 and held the post for 4 years. I became Secretary again at the beginning of 1910 and have continued in office since. So you may think it time you had a change; in which case I shall be very glad to give all the assistance in my power to my successor.

The report was ordered to be printed. The accounts were found correct. Resolved: "That the unpaid subscription of 2 members who left the District before January 1st, 1911 be written off, and that the attention of 4 other members who are in arrears be called to the fact. The accounts are to be printed.

Mr. Abbott was re-elected Honorary Secretary and thanked for his services during the year.

1744. *Rules.*—Mr. Bownass gave notice (as Mr. J. Carson Parker's representative) that at the next meeting he would propose that a permanent Chairman be appointed, and that Mr. Abbott be asked to act as such for the year.

1745. *Membership.*—The following resolution was proposed by Mr. Abbott seconded by Mr. Powell and carried: "That as certain planters, not residing in Malabar Wynaad and not now owning land in the District who have been members of this Association for many years, desire to continue their membership, it is resolved to accept their personal subscription for the current year.

1746. *Roads.*—Read correspondence connected with Vayitri-Achoor Road (No. 31) which had been sent to the Honorary Secretary by the President District Board.

The Honorary Secretary was instructed to ask the District Board Engineer what money it is intended to spend on this road in 1912-13.

1747. *Sectional Meeting.*—Read letter from Mr. Nicolls, Honorary Secretary, Nilgiri P. A., dated January 22nd, stating that he had been asked to arrange with the Wynaad Planters' Association for a sectional meeting to be held at Calicut or Coimbatore in February and to invite members from the Anamalais and Shevaroys to attend.

Proposed by Mr. Waddington, seconded by Mr. Stewart, and carried: "That the members of this Association thank Mr. Nicolls and the Nilgiri P. A. for their invitation, but that as they have at present no business to bring before the proposed meeting they do not think it necessary as far as Wynaad is concerned."

1748. *Poodupardy Hotel.*—Read letter from Mr. C. Chengaren, Hotel keeper, asking for an increased contribution towards the expenses of upkeep. The Honorary Secretary was asked to enquire into the matter, and to report to the next meeting.

1749. *Dates of Meetings in* 1912.—It is proposed to usually hold the meetings on the *first* Wednesday of every month, except February, April and May.

1750. *Mr. Nicolls' cases.*—Read letter from Mr. Nicolls with judgment on appeal in Kappini and Hoolchus cases. The conviction was confirmed. Mr. Nicolls is appealing in Pongay's case. Recorded with satisfaction.

1751. *Freight to America.*—Messrs. Volkarts desire it to be known that the American and Indian line of steamers have started a direct monthly service between Tuticorin and New York for which they are the Agents.

1752. *New Member.*—Mr. C. L. Egan will be balloted for at the next meeting.

A vote of thanks to the Chair terminated the proceedings.

(Signed) H. WADDINGTON, *Chairman.*
(„) C. E. ABBOTT, *Hon. Secretary.*

Note.—The Hon'ble Mr. J. G. Hamilton writes that he will be in Madras in February and will be glad to have early notice of any business to be done.

——:o:——

Mundakayam Rubber Planters' Association.

Minutes of the Annual General Meeting held at Yendayar Bungalow at 10 a.m. on Saturday, the 13th January, 1912.

PRESENT.—Messrs. J. J. Murphy, G. H. Danvers Davy, J. R. Vincent, F. H. Hall, C. B. Hall, H. M. E. Howson, F. E. Vernede, E. R. Gudgeon, M. Smith, H. Byrne, R. T. Redmayne, C. Henderson, R. Harley, Chairman, and A. C. Vincent, Acting Honorary Secretary.

1. The Minutes of the last meeting were taken as read.

2. The Honorary Secretary's report is as follows:—

Gentlemen,—As you are aware, I have only been acting as Honorary Secretary in place of Mr. Hall, who has been on leave, but as I have been asked by the Chairman to report on the year's work of the Secretary I will try to do my best to give you an account of what has been done.

I find that as far as subscriptions to the Association are concerned there is only one Estate that has not yet paid. This I hope to get in a few days, as a request has already been sent out. There are also due from the same Estate the subscriptions to the Laboratory and Exhibition funds, and one other Estate has yet to pay the Exhibition fund subscription. This has been promised me in a day or two.

I would take the opportunity of reminding members, of the Planters' Benevolent Fund. Only one subscription has been received to date for the year 1911-1912, and it is hoped that members will send in their subscriptions as soon as poosible. The minimum annual subscription is Rs.10 and can hardly strain the most slender resources.

As to the year's Secretarial work I find that first of all the Honorary Secretary was asked to correspond with the Post Office Department, regarding the removal of the local Post Office. This was satisfactorily carried through, and the P. O., as you all know, is now removed to a more central position at the 35th mile. Whilst on the subject of Post Offices, I may state that the Department has not yet seen its way to grant a telegraph office at Eruttupetta as requested by Mr. Asher, without a certain guarantee from the Travancore Government. The Association is still corresponding on the matter, and it is hoped that the office may be established very soon.

Roads.—With regard to these, I am glad to say that the Government has allotted a sum for the repair of the Lalam-Eruttupetta Road and its bridge, and this badly needed work will, we hope, be soon carried out. The Association is still corresponding with Government with regard to the Kutikul-Poonyar and the Kadamancolam roads, but nothing definite has yet been done. An innovation has been made in Travancore in the levying of tolls on the Kottayam road at Kanjirappalli Bridge, and a resolution is being put forward to-day in regard to this.

I am informed by the Honorary Secretary of the Central Travancore Planters' Association that Mr. H. C. Westaway has been appointed Sri Mullam delegate this year and that the question of these tolls is one of the subjects he is bringing before the assembly.

Wharf Charges at Kottayam—These charges, I understand, are only on goods that remain on the Wharf for more than 48 hours, and therefore it is really a question of our Agents claiming the goods quickly and thus avoiding the charges.

Charging Station at Mundakayam.—The Government has been addressed on this matter, but up to the present has not favoured us with a reply.

Uniform Rice Measures.—At the last meeting of the Association I was requested to see to this, and I have since asked one of the chief merchants in Mundakayam to obtain a number of edinglees of uniform size, which, on arrival, I shall be glad to distribute to the various Estates who will be willing to use them.

I do not think I have any more to say regarding the work of the Honorary Secretary for the past year. Our Chairman, I trust, will give you what information I have omitted as to the progress of the Scientific Officer Scheme and other schemes under consideration.

3. The Chairman then read his report as follows:—

Gentlemen,—As Vice-Chairman it has unfortunately fallen to my lot to take the Chair to-day. Early in the year, Mr. Murphy, the district's elected Chairman, arranged to take leave and, believing he was really leaving us, resigned the Chairmanship, which then fell to me to make the best I could of. I feel I am in an entirely false position in addressing you to-day, as Mr. Murphy is still in our midst and apparently in the best of health.

During the year the quarterly meetings of the Association have been well attended but to-day the district is not so well represented as might have been wished. In this respect we are in the same position as last year, when the Chairman had to regret the scarcity of members attending the annual meeting. It seems more than probable that the reason for the poor attendance of the annual meeting is due to the fact that Superintendents are too busy clearing off their past season's accounts to be able to give a whole day to attending the Planters' Association.

At present, times are good for the planter, so much so that he finds himself very little dependent on his district P. A.; but, gentlemen, there have been times when he would have gone absolutely to the wall if it had not been for the Association. With this in view and knowing that in the future we must put our produce on a very much less favourable market than the present one, it is to be trusted that members of the Association will give their very best support to the district and the U. P. A. S. I.

At the close of 1910 the Mundakayam District represented 9,652 acres of Rubber and Tea. At the close of 1911 our district has grown to 10,973 acres or in other words that 1,321 acres have been opened during the past season. This does not really represent the real increase of acreage put into Rubber and Tea. In and around Mundakayam during the past season I believe that native companies have opened not less than 1,500 acres. This together with the native opening in 1910 means that Mundakayam district is not less than 12,500 acres.

During the year, the chief real work accomplished through the Association has been the establishing of a European Doctor between our district and Peermade. The value of a Doctor in our district has already been appreciated by several planters who have met with accidents besides a very large number of employees and coolies who have benefited by the Doctor's treatment and advice.

Another scheme which has been dealt with by the Association during the past season has been the "District Scientific Officer Scheme." During the year we have done our best to persuade Proprietors and Company Directors to support a Scientific Officer for this district. Up to the present only one company has declined to participate in the scheme. Rather more than half the district acreage has decided to support the scheme on the submitted lines, while those companies and proprietors who have not yet come to a decision are in several cases only waiting to learn fuller details of the scheme and its utility before doing so.

Should these latter Estates join it would mean that 94% of our acreage is in favour of supporting a Scientific Officer, so there is still hope that we may see the scheme bear fruit.

During the year the London Rubber Exhibition has been held and members are all aware from reports issued by London brokers on the samples sent from this district, that considering the simple manner in which producing Estates had prepared their produce, reports were generally extremely gratifying.

At the last annual meeting the Chairman informed you that there were prospects of Government passing a Rubber Thefts Act. The Act as framed by Mr. Richardson was not adopted, as it was noted by the Council that it did not provide for Licensed Dealers. When Mr. Richardson went home, Mr. D. G. Cameron became the Planting Member of Council, and he has looked after our interests well and given considerable time to getting the Act re-framed on the Ceylon Rubber Thefts Act lines. Although the Council has not yet passed the Act we have our member's word for it that Government will probably give us the protection we ask for at an early date.

I have left the Labour question until very late in my report. My reason for so doing is that no Estate seems to have met with any real difficulties in being able to obtain sufficient labour for putting through the season's programme of work; in fact I think I am right in saying that our district is becoming very popular with coolies and that in the past year Estates have lost very much less in bad debts than in any previous season and that labour has been very plentiful.

CORRESPONDENCE.

4. *Doctor Scheme.*—The Honorary Secretary read a letter from Dr. Lindsay. Proposed by Mr. Murphy and seconded by Mr. J. R. Vincent, that the letter be referred to the Medical Committee, and that the Honorary Secretary be requested to ask the Secretary of the Medical Committee for information as to meeting, etc.

5. *Tolls at Kanjirappalli Bridge.*—Mr. J. R. Vincent's resolution, seconded by Mr. G. H. Danvers Davy, was carried unanimously as follows:—

"That all managers of Estates in this district be asked to refuse to pay any toll charges on freight carts plying on the Kottayam-Kumili road, and that the Honorary Secretary be requested to communicate with the Peermade P. A. asking them to refuse to pay these charges, believing that the cartmen, who make large profits, are the proper persons to pay." The resolution to be acted upon from the 1st February 1911, and the Honorary Secretary requested to write further to the Central Travancore Planters' Association and the Kottayam Agents.

6. *Scientific Officer Scheme.*—Proposed by Mr. Murphy and seconded by Mr. J. R. Vincent, that the Estates in this district who did not agree to this scheme be asked to reconsider their decision, as 8,800 acres out of a total of 10,900 acres have agreed. It was pointed out that if these Estates did not fall into line, the scheme would have to be dropped.—Carried.

7. *Veterinary Hospital.*—It was resolved to support the Central Travancore Planters' Association in their appeal to Government for a Veterinary Hospital.

8. *Labour.*—Mr. J. R. Vincent's resolution: "That this Association do hereby communicate with the Peermade P. A. with a view to securing our mutual interests with regard to bolting coolies and maistries" was seconded by Mr. F. Hall and carried *nem. con.*

9. *Arbitration on Labour Disputes.*—The Chairman stated that this had been effected to the satisfaction of all parties.

10. *U. P. A. S. I. Subscription.*—Mr. Murphy proposed and Mr. J. R. Vincent seconded: "That rate of Subscription to the local Association remain at 10 cents per acre for the current year, but that it be raised to 16 cents next year to allow of paying the parent Association a cess of two (2) annas per acre from August 1st, 1912; provided that all other Associations do so."—Carried.

11. *Post Office.*—The Secretary was instructed to again address the Post Office Department in the matter of delay in delivery of parcels.

12. *Accounts.*—Mr. Murphy consented to audit these.

13. *The Election of Office Bearers*—resulted as follows:—

For the ensuing year:—

Chairman	... Mr. J. R. Vincent.
Vice-Chairman	... Mr. G. H. Danvers Davy.
Honorary Secretary	... Mr. A. C. Vincent.

The following gentlemen were elected on the Committee:—

Messrs. E. Eyre, W. A. Asher, G. Atkins, and R. Harley.

Mr. J. R. Vincent kindly offered Kutikul Bungalow for the next meeting of the Association, and the Proceedings terminated with the decision to send Books of Proceedings to all members and votes of thanks were accorded to the Chairman and Honorary Secretary on the proposal of Mr. G. H. Danvers Davy, seconded by Mr. Murphy.

(Signed) J. R. VINCENT, *Chairman.*
(") ALFRED C. VINCENT, *Hon. Secretary.*

TEA.

Green Manuring, &c.

The following are extracts from a lecture by Mr. R. Kelway Bamber on the improvement of tea by green manuring, careful pruning, and plucking, given at the recent meeting of the Dolosbage P. A. Mr. Bamber said: During the last few years considerable attention has been paid to this subject, and results generally have fully warranted the trouble and expense incurred. Mistakes have no doubt been made from inexperience as to the most suitable plants for the soil and district, and from not realising the rapidity of growth of some of the leguminous plants and the amount of labour required to deal with it efficiently. The object of green manuring was, in the first instance, to replace the organic matter in the surface soil. Most of the original jungle soil in Ceylon was rich in humus from the accumulations of leaf mould and decaying vegetation, which largely accounted for the luxuriant growth of coffee or tea when planted in such newly-cleared soil. The want of efficient drainage in the past and the prolonged action of a tropical sun and heavy rainfall soon accounted for not only the actual loss of the original surface soil, but the more or less rapid oxidation of the humus in the subsoil, from which the nitrogen required by the plant was chiefly derived. With the loss of surface soil and humus, and the available lime in the soil, bacterial activity must have steadily diminished, with the result that nitrification took place far less rapidly, and in many instances practically ceased. This naturally resulted in slower growth of the tea bushes themselves, more marked hardening of the wood and less capacity for yielding heavy and abundant flushes. To remedy this it was first necessary to restore as far as possible the physical and chemical properties of the original soil. Artificial manures alone could to a large extent restore nitrogen and the essential mineral constiuents such as lime, magnesia, phosphoric acid and potash; but the comparatively small amounts of organic matter supplied by 300 or 400 lbs. of various cake-residues, could have but little physical effect on the soil. Green manuring was therefore the only way to restore the original fertility, and for several years now leguminous and other plants, indigenous to Ceylon, and brought from other tropical countries where tea was being grown, have been experimented with at the Government Experimental Station, Peradeniya, and on a larger scale on many estates in the Island. Crotalarias of several varieties have been tried with varying success. *Crotalaria Striata* was the most successful, and yielded large quantities, eight to nine tons of green material per acre during the year. It had, however, several objections, one of which was the difficulty of getting it established in very poor washed soil. This caused a patchy growth, and unless weeding was carefully attended to, weeds grew apace and seeded freely in the thinner spots, causing an increase in the subsequent cost of weeding. It grew most luxuriantly during the busy season months, when the labour was not available for cutting and mulching between the bushes, so that it had a tendency to become woody, and when cut in this state, die out or form seed with little leaf development. *Indigofera anil* is another plant that does well in tea on certain soils. It has a good branching habit and stands cutting well, but like crotalaria becomes woody if left, and is then troublesome and expensive to remove. The latest and best plant of the bushy kind is the *Tephrosia candida* (Boga medeloa). It grows luxuriantly from 1,000 to 3,000 ft. elevation and yields more green material per acre than any similar plant. In suitable soil it does not flower early, but forms a dense leafy growth with a gradually increasing layer of the lower dead leaves. It stands cutting well, and one plot planted in rows one foot apart at Peradeniya has yielded 58·02 tons of green material from four cuttings in the year. This contained approximately 2,639 lbs. of nitrogen, which at the equivalent value of nitrogen in sulphate of ammonia would be worth over Rs.1,300. In general practice such a yield can hardly be expected, but even with one fourth the amount the improved value of the soil can be imagined. In growing such a crop it must be remembered that the mineral requirements are all taken from the soil and therefore compete with the tea roots. Analysis shows the ash to contain 20 per cent. lime, 31'6 per cent. potash and 7'20 per cent. phosphoric acid. This drain on the soil has to be supplied, and in order to get such a large bulk of vegetable matter, it pays to apply a mixture of lime, slag and sulphate of potash to this growing crop such as generally given to tea at the time of pruning. In practice it has been found that *Dadaps*, *Erythrina lithosperma* and *Albizzia moluccana* are the best forms of green manure to grow in tea between sea level and 4,000 ft. as they interfere less with weeding, and at the same time afford some protection from wind, while yielding a large amount of valuable leafy material. The dadap does not do well below 1,000, but between that and 4,000 grows very freely if the soil is sufficiently porous. It has the advantage of growing freely from large cuttings as well as stumps and seed, and with certain precautions can soon be established. It is always advisable to hole properly for these plants unless the soil and climate are particularly favourable, and much disappointment and loss of time might have been saved had this precaution been taken. It is also advisable to plant the cuttings within a few hours of making them, as even a day's delay means the death of many. In planting both dadaps and albizzias, it is always advisable to put in one or two seeds with every plant or stump, as it tends to insure a more immediate successful planting, and save the loss of the planting season and a year's growth. The best way to treat the dadap for improving tea, is to lop across at 4 ft. or 5 ft. when 10 ft. high and to repeat this, whenever necessary, usually three or four times during the year. If allowed to grow too high it becomes expensive. The loppings should be laid up every other line of tea after a preliminary deep forking leaving the soil as rough as possible. The following year or after the next tea pruning the other line to be mulched in the same way. There is no need to bury if ground forked roots do not come up. At Peradeniya the dadap plot has given most satisfactory results, no manure except a mixture of basic slag 200 lbs. and sulphate of potash 60 lbs. having been applied at the last pruning in October, 1909, and again just now when the plot had run about 26 months between prunings.

The total weight of dadap for the four years was 80,470 lbs. and this at 0'285 per cent. nitrogen equals 57'33 lbs. of nitrogen per acre per annum. This amount of nitrogen is usually applied every second or third year in an artificial mixture at a cost of about Rs.30 per acre for nitrogen only, so that the value of this annual increase of introgen and organic matter in the soil can be estimated. The tea yields for the last four years were :—

1907	...	... 767 lbs.
1908	...	... 780 lbs.
1909	...	... 1,296 lbs.
1910	...	... 1,445 lbs.
1911	...	... 1,500 lbs. about and pruning.

The value of dadap manuring for tea is therefore apparent. I may add the dadap plot at Denford over 4,000 has also given very satisfactory results. The albizzia plot has also been very good, but not quite so successful as the dadap. It suits the low-country better than dadaps and grow up to 5,000, but too slowly at the latter elevation for green manuring purposes.

It stands wind-better and does not require such frequent lopping. Although the weight of material per acre is less, the leaves have the advantage of falling practically to powder on drying, so that they become more evenly mixed in the soil. The total yield of green material in 3¼ years was 23,814 lbs. which was mulched up alternate lines resulting in an increased yield from 621 lbs. to 994 lbs. per acre. The value of nitrogen in the loppings was Rs.148.

In some low-country districts albizzias can be allowed to run up 40 x 40 or 28 per acre. These plants are the most suitable for this district, and as far as I have seen are the ones now being adopted.

PRUNING.

This improvement of the tea cannot take place, however, until the bushes are in a condition to have a free flow of sap. Good low pruning into clean wood below all knots is, therefore, the first consideration if success is to be abtained. There has been an immense amount of waste from manuring without proper pruning, as with old knotted branches it is impossible to get a free flow of sap through the bushes and any beneficial result is only temporary. It is therefore impossible to cut down a whole estate in a round of pruning, but the bushes can gradually be renovated by first cutting below the knots of all the branches, and sawing off one or two of the worst branches from close to the ground. At the next round another branch can be sawn out low down so that the bush becomes practically a new one, with good straight wood from the ground and a strong root development below. This new wood should be cut at about 8 in. to induce branching and get a new spread as rapidly as possible. (Often done at 15 in.—18 is a great mistake.) All cuts should be short, which means the knife must be kept sharp. The general practice was to leave the prunings on the surface, without forking or cultivation. Later the burial of prunings was commenced, and on most estates it had very satisfactory results, especially in the low country. On steep soil it rather tended to increase wash, and on clayey soils in wet districts it caused the death of many bushes from *rosillinea*. The latest method is deeply to fork alternate lines, and to heap the prunings from two rows of bushes on the same line. When the leaves dropped they fell into the rough soil, and the branches kept the coolies from treading down the newly forked line. A modification of this method is to heap the prunings without forking, and when the leaves drop to remove the branches to the next row. Basic slag mixture is then broadcast on the leaves, and the whole deeply forked without actual turning. The branches can then be thrown over the row again. It costs an extra rupee per acre, but is money well spent.

PLUCKING.

The old system of plucking which until recent years was fairly general in Ceylon, was, in my opinion, one of the chief causes of the gradual, and in some instances rapid, deterioration of tea. It consists in plucking more or less to the whole leaf for a few months, and then taking everything down to the fish leaf for several months before pruning. The effect was to exhaust branches and older wood of reserve material, which was necessary for the development of new shoots after the leaves and upper branches had been removed. This naturally resulted in bushes coming into bearing more slowly year by year, with an earlier hardening of the young wood, and a gradual falling off in flushing power and yield. The root development was also affected to a large extent. Heavy manuring at great expense would gradually bring the bushes round, but it can be done far more cheaply and satisfactorily by pruning as suggested above and then plucking the whole throughout from pruning to pruning, except perhaps, a few rounds to the fish leaf during the busy season which encourages more flushing points from dormant eyes but in this case whole leaf plucking should be reverted to before the rush is completely over.

It is not generally realized what a marked difference such treatment has to the tea bush, and coupled with the improvement of the soil by forking and addition to humus by green manures and the application of moderate mixtures to supply some available mineral constituents and nitrogen, there is hardly any tea that will not respond readily, and gradually form a dense cover over the soil.

MANURING IN THE DISTRICT.

After making some comments on the different artificial manures Mr. Bamber added:—Coming through the district, there is considerable evidence of wash, and there is still ample depth of soil, which can be renovated by green manuring. Care and perseverance are required, but every endeavour should be made to establish systematic green manuring at the earliest possible date, so that in time the amount of nitrogenous artificials required can be reduced to a minimum and the cost of manuring also. The good effect of green manuring with dadaps on Barnagalla is very apparent to all, and Mr. Smith is to be congratulated on his success, and there is no reason why similar success cannot also be obtained by most estates in the district.

Indian Tea in 1911.

We have again to note another record year in the delivery of Indian tea and all to the credit of home consumption. The crop of 1910-11 entered for the London warehouses was 9 million lbs. less than the previous season, or say 165,371,000 lbs. against 174,323,000 lbs. but it must be noticed that the London warehouse figures do not agree with the Board of Trade figures, which include also what is sent into other bonded warehouses in the United Kingdom, and the latter do not make up their figures for the season but for the year. In 1910, by the Board of Trade, we find we imported 180½ million lbs. or 3 millions less and for the rest of the season we landed 2 or 3 millions less owing to a sudden early closing of the 1910 and 1911 season. The season's crop we are now dealing (1911-1912) is expected to be some 6 millions lbs. larger than last season and the exports from Calcutta for the United Kingdom are some 11 millions lbs. more, but owing to transhipments, etc., we only seem to have received some 5 millions more, while for London werehouses only some 2 or 3 millions more are entered. However, at this time of the year it is impossible to say what surplus we shall receive for the season, as one cannot tell how much other countries will take direct. Up to the end of September Russia had been a large buyer especialy in the early months of the year but during the last few months the Russian buying in Calcutta has fallen off considerably, the reason being the famine in Russia curtailing the consumption and buying power of the poorer classes. The imports from January 1st to December 31st are about 186 million lbs. while the total deliveries are 187 million lbs. against 181 million lbs. in 1910 or 6 million lbs. increase. The stock in bonded warehouses is over 6 million lbs. less, but the strike in the summer found the trade so bare of duty-paid tea, that the blenders and retailers have no doubt altered their policy and are now carrying a much larger duty-paid stock, as evidenced by the large deliveries for home consumption during the last few months, thus making the apparent increase in consumption larger than it really is. The year commenced with a stock of 79 million lbs. or 2 million less than the previous year and with some 2 million less of the 1910-11 crop to come in there was a strong and rising market for priced teas for the first five months of this year. There was, however, a good deal of red stalky leaf which was neglected by the trade. Export orders were good and there was a large buying in order to pay duty in anticipation of the Budget—the middle of May—after that, trade was very quiet for a month or so and prices receded quite ¼d. per lb. New seasons in July were well received and quality although light was better, prices opened ½d. to 1d. per lb. higher. Now that the bulk of the new crop has been the general opinion is that it is a good average one—perhaps many of the teas are rather too light in cup, but the condition of the infusion shows a dry summer, which enhances the quality, but leaves the cup light and dry with less sap. The best teas have been a very fine crop although a small one, and one found the trade complaining of a falling off in the quality much earlier than usual. Fair low-price grades have been a rising market more or less since the opening and prices have been uncomfortably high for the trade—blenders havy however been big buyers of the grade above common and for which thee had to pay very little more, and value for medium grades has been good and moderate. Owing to the high prices ruling for common tea all through the year, the trade and large multiple-shops have had a worrying time, but fortunately great efforts are being made to show the consuming public that it is more economical to use a better article, as it goes farther and is decidedly better from a health point of view. On the other hand the growers have had a splendid year, the average profits on the cheaper grades being about ¾d. per lb higher than last year while many of the gardens that turn out fine teas show 1½d. or 2d. per lb. more profit. The new crop has been hurried along and printed for sale often before it was out of the steamer and already some 6 to 7 million lbs. more has been sold at auction than last year, and if we only receive 6 or possibly 7 million lbs. more this season than last year, it is said we shall not have as much to deal in the rest of the season as we had last season. The big blenders for the last 6 months have been relying on China to help them in their low blends, but at the rate the latter is being used there will be none available in 3 to 4 month's time. If the rebellion and unrest interferes with sending up country money in the early months of the New Year to buy leaf for the new crop, the result will be appalling. China exported to the world in 1910 some 207 million lbs., including 85 million lbs. of brick tea. If this is interfered with, Russia would be in a panic and rush in to buy British-grown tea at any price. However, such an eventuality is only a possibility, but it is well to be prepared. The high prices realised for dusts and fannings has been a feature this season. and at the time of writing are selling at 1d to 1¼d more than this time last year, while inferior leaf is only bringing ¼d and in some cases ½d per lb. more. There was a slight set back in prices the beginning of December, owing to heavy shipments from Calcutta and Colombo in November, but prices quickly recovered and the heavy sales towards the end of the month met with active competition, much to the surprise of the sellers and with the good augury of strong markets in the New Year.—*The Grocer.*

Ceylon Tea in 1911.

Although last year's crop was a very short one owing to bad and wet weather, yet this year has been equally short owing to very severe drought which lasted an abnormally long time, and it was not until the last two months of this year that the drought broke up and gave such heavy flushes that the shortage was made up, and we shall probably receive some 2 to 3 million lbs. more or, say, 110 million lbs. against 107¾ million lbs. in 1910, and 117 million lbs. in 1909. Naturally, dry weather and short crop means better quality and many of the gardens have turned out very good tea. When the heavy flush commenced in November, the managers plucked coarse and some very inferior teas were turned out, so much so that some of the teas were considered too poor for our market and more suitable, for native requirements. As we write, the supplies just arriving show a decided falling off in quality, and probably we may see still more inferior teas while shipments are so heavy. Total deliveries for the year show a falling off of 4 million lbs. or 3 million lbs. less for home consumption and 1 million less for export—the total quantity being 109 million lbs. against 113 million lbs. in 1910. However, as we have remarked before, delivery of Ceylon tea is governed by supply and a falling off in home consumption does not mean that it is losing in popularity. We have delivered just what we have received. Ceylon differs from India and China, inasmuch as there is a flush all the year round and the trade buy from week to week and use it at once, so that no one holds a stock. The stock on January 1st 1911, was 17 million lbs. and it will probably be about the same at the close of this year owing to the larger imports of November and December. We find that Australia and Russia have taken rather less black tea direct from Colombo but North America has taken more owing to the prosperity and increasing population in Canada. More green tea has been made this year. and there has been such a good demand for America and Russia and prices are very remunerative. There has been a good steady demand throughout the year, and prices generally ruled higher in value than Indian teas, which is more noticeable in good liquoring leaf kinds on account of export orders. The average price of Ceylon tea for the year is nearly ¾*d.* per lb. higher than last year while the price to-day for common to fair Pekoe Souchong is quite ½*d.* per lb. higher. Transhipments this season of all kinds of tea have been 3 million lbs. more than last season, the bulk of which was probably for Russia and America. These 3 millions are entered at their respective ports as coming to the United Kingdom, but in reality we get so much less.—***The Grocer.***

Java Tea in 1911.

Only part of the newly planted acreage has yet come into bearing while the drought that has affected the Middle East applies also to Java, the consequence being that the total increase of the exports to all countries is not more than 5 million lbs. Of this increase, however, we get no benefit, as Australia, Russia and Holland have taken it all, and we find that we shall receive nearly 1 million less, or say, 13½ million lbs., against 14 millions last year. Deliveries, on the other hand, show an increase of half a million lbs., and the stock has decreased by over 1 million lbs. leaving us with less than 6 weeks' stock. The quality of these teas is steadily improving under more experienced management and cultivation, and Java tea finds much favour against the blenders, both on account of its price and plain useful cup. Java has a great future before it, and in a few years' time we shall find it taking a prominent place in the tea market. The average price for the year is nearly 1*d.* per lb. higher than last year, and owing to cheap labour, etc., the estates are making handsome profits.—*The Grocer.*

Future of American Tea.

" American tea is by no means an impossible product of the future," says Secretary Wilson, of the United States Department of Agriculture, he being of the opinion that the obstacles in the way of this achievement may finally be overcome by persistent effort. The work in tea culture carried on at Summerville, S. C., has continued to give favourable results, and although this season (1911) was somewhat discouraging from the standpoint of rainfall, the year has been satisfactory.

RUBBER.

"Hevea brasiliensis" in Mexico.

Reference has been made on several previous occasions in these columns to the progress effected by the practical introduction into Mexico of the Pará rubber tree (*Hevea brasiliensis*), and a recent visit to the property of a British corporation known as El Palmer Rubber Estates Limited,—situated near the station of Tezonapa on the Vera Cruz and Isthmus Railway—afforded the writer an opportunity of studying more closely what had been accomplished there and of amplifying details already given, in respect of this interesting and important departure. When the original experimental nursery of Hevea at El Palmer was first seen by your correspondent in March of this year the plants (in number some 7,000 representing a 70 per cent. stand in germination from imported seed) were about 5 months old and of an average height of 3 feet. Within the brief space of 4 months they were observed to have grown to twice this height, a considerable proportion reaching even as much as 9 feet, with a girth, at 1 foot above the ground, of 2½ inches—results comparable with the best obtained in the East. These seedlings have since been successfully transplanted into the field, and an order has been placed for 100,000 more seed, which consignment is now almost daily expected to arrive, specially prepared ground being in readiness for the same.

Other estates in Mexico upon which tentative trials have been made with *Hevea* are those of La Buena Ventura, on the Isthmus of Tehuantepec; Batavia in the District of Tuxtepec, State of Oaxaca; and El Chival and Hular Ramirez in the State of Chiapas. One of these trees on the first-named property, when five years old, measured 20 inches in circumference, at 3 feet above the ground. At Batavia there are about fifty specimens, from seven to ten years old, growing in a clay soil. Some of them have borne seed several times, and, according to the latest reports, all are in a flourishing condition.

It is worthy of mention notwithstanding the much earlier trials of individual planters and planting companies, as indicated in the foregoing, that the Agricultural section of the *Departamento de Formento* of the Mexican Government has lately imported from Ceylon several thousand *Hevea* stumps, having distributed and delivered them, in lots of from 50 to 500 free to all *bonâ fide* applicants, with the object of promoting tests of this culture under varying physical conditions, reports embodying such data being invited as to the results secured,

With regard to the satisfactory growth of *Hevea* that has been noted in Mexico, so far as experience has gone, it may be contended that such evidence may later prove as delusive as it cannot be denied has been the case, unfortunately, with former anticipations respecting *Castilloa* in Mexico. This possibility is, however, measurably disposed of by the fact that in certain places where *Castilloa* has not done well, perfectly healthy *Hevea* trees, five and six years old, are to be seen to-day. *Hevea* appears to be far less capricious than *Castilloa*, adapting itself much more readily to a greater variey of soils.

It has frequently been maintained that a prolonged season of rainfall is essential to the well-being of *Hevea*; but it has been found in practice that, given a soil sufficiently deep and granular in character to provide adequate capillarity from the lower water level, the best growth has been attained with a moderate but well distributed rainfall, ranging between 90 and 120 inches per annum. It is held moreover, by some, that a well-defined dry season is a natural advantage, as tending to check excessive transpiration. Apropos of this point, the writer learned in conversation with Mr. J. C. Harvey, shortly after that gentleman's return from London (where he went to attend the recent International Rubber Exhibition) that the Directors of the Agricultural Department of the Indo-French Colonies of Cochin China, in the course of an instructive lecture on *Hevea* cultivation in those regions, had stated that the total precipitation there was distributed over six months of the year. This would seem to be an exceptional and extreme case, similar conditions certainly not prevailing in any of the rubber planting districts of Mexico, where, as a matter of fact, both rainfall and temperature are generally suitable for *Hevea*.

Hevea exhibits in the early stages of its development a peculiar physiological phenomenon in what is termed periodicity of growth. Instead of any continuous growth, as in *Castilloa*, a series of distinct sectional growths appear to be made during the year; the standard or main stem shooting up with great rapidity from a matured terminal bud to the extent of 1 or 2 feet within a period of a month of six weeks. Growth then temporarily ceases, and the newly produced section more or less ripens during the succeeding quiescent interval of a month or two, when the activity of the plant is renewed in a similar manner. The typical form of the *Hevea* tree, for the first two or three years, is slender and whip-like, swaying with the least movement of the air, this being in marked contrast with the rigid and stocky constitution of *Castilloa*; but during the fourth or fifth year the tree begins to assume a more stable form, when whorls of lateral branches, more or less regularly disposed, are developed and steady trunk expanse ensues.

With reference to the detail of planting distance for *Hevea*, experience seem to have definitely relegated very close planting to the past. Mr. H. A. Wickhám, the well-known pioneer of *Hevea* cultivation in Ceylon and Malaya, has gone so far as to advocate planting at such apparently extreme distances as 30 to 40 feet; but the preponderance of authoritative opinion places the distance rather at from 16 x 16 feet to 20 x 20 feet, and certainly the latter (giving, respectively, 120 and 110 trees to the acre) would allow liberal space for root and branch development for a good many years.

As to methods of cultivation, complete clean weeding, as against suitable cover growth between the rubber trees, is still a debatable question, although the late Mr. J.B. Carruthers, of Trinidad, who had devoted much special study to it, was very decided and urgent in his view as to the actual necessity of the latter method for the restoration of humus, the aeration of the soil and the prevention of erosion. Perhaps a *via media*, involving the keeping in subjection of weed growth until the trees commence to shade the ground, and then permitting the natural herbaceous vegetation to come up between the rows of rubber trees, would commed itself to most planters on practical and economical grounds.

There is in Mexico one enemy to *Hevea* that must, from the very first, be seriously reckoned with, namely, the "Tusa," as it is called in this country, a subterranean rodent, commonly known in the United States as the gopher (*Geomys bursarius*.) The species found in the tropical sections of Mexico (and known to occur at least as far south as the Isthmus of Panama) is rather larger than the North American species but appears to be identical in habits. In Chiapas this pest is, or was, a grave menace to young plantings of *Castilloa*, and on one estate with which the writer is familiar, men had to be specially and regularly employed in trapping the vermin. On the Isthmus of Tehuantepec the gopher has not shown any particular liking for *Castilloa*, but has confined its depredations mainly to cacao. These animals, however, did much damage to young *Hevea* trees there, and constant vigilance had to be exercised to prevent them from destroying all such trees. The fondness of the gopher for *Hevea* is probably due to the large percentage of starch contained in the roots of that tree;

and it would seem well, in setting out *Hevea* in Mexico, to make a systematic attempt to exterminate this vermin immediately after the burning of the clearing. To this end all colonies of gophers should be located and marked in some easily visible manner, concurrently with the staking of the ground, proper traps being set at the time, as the least delay is dangerous. In case of failure to capture the animals by such means after persistent effort, the only thing left to do is dig them out of the ground with spades. Bi-sulphide of carbon, introduced into the subterranean passages by soaked pieces of cotton waste, has been used with considerable success; and if the gopher inhales the fumes given off by this chemical, death is sure, but one rarely has the certain evidence that the animal has been killed, while trapping and digging them out leave no doubt on this score. Once thus annihilated, immunity from the pest may be assured for some time, and, when making subsequent clearings of the planting. its possible entrance from contiguous breeding grounds may be similarly dealt with.

Considering, on the other hand, the non-existence in Mexico of that deadly vegetable parasite, *Fomes semitostus*, and the hardly less destructive insect pest, *Termes gestroi*, against the ravages of which planters in the East have ever to be on the alert, we may count ourselves here, in the light at least of present knowledge, relatively fortunate. (The above-named termite is quite distinct from the Mexican species, in that it penetrates into, and works upon, living trees; while the latter—commonly known as the "Comejen—only attacks dead wood.) Following the best scientific advice, which a beneficent government places at their disposal, planters in the East are now going to the vast expense of removing all stumps and roots from lands destined to the planting of *Hevea*, in an organized effort to minimize the propagation of *Fomes semitostus*, which is classed as a contagious disease fungus, spread by underground mycelium.

Without reflecting upon the possible profitableness of *Castilloa* cultivation in Mexico where the natural elements are thoroughly favourable, it must be conceded, in view of the higher productive capacity of *Hevea* as compared with any other rubber yielding tree, that the successful establishment of a planting of *Hevea*, under suitable conditions, cannot but greatly enhance the speculative value of any estate so exploited, and upon which surplus forest or other appropriate virgin areas are yet available; and it would seem that the prospects with regard to this culture in Mexico are sufficiently encouraging to warrant its adoption on cautious lines as a potential means of compensation for the limited realization of *Castilloa*. —*India Rubber World*.

Factories on Plantations.

It is, for obvious reasons, necessary to provide, on estates with large areas in bearing, some building wherein the rubber can be protected during the coagulating, washing, drying, smoking and packing stages. The washing machines and engines, with the necessary shafting, are usually of a heavy type; and these, together with driers. fans, and other appliances, necessitate the construction of buildings of a substantial and permanent character.

SELECTION OF SITE.

The selection of a suitable site requires, in some countries, considerable thought. On hilly estates, it is customary to select some area as low, while as central, as possible. This generally enables the manager to economise in transport and sometimes to use water power. On such properties, sites which are swampy, liable to flood, or unhealthy, should be avoided. It is often much cheaper to select a site at some altitude, and pump water up to the factory, than to choose a place convenient only for water and transport.

In considering the site in relation to transport, it should be borne in mind that carrying the latex—which may contain more than 50 per cent. of water—to the factory is more expensive than subsequent transport or dry rubber to the nearest cart road. The selection of a site is also partly determined by the accessibility of the area of passenger and cart traffic, proximity to a good, clean supply of water, exposure to wind, and the character of the subsoil. In Ceylon and other hilly rubber districts, the subsoil is usually safe for foundation work but in the wet, flat, and somewhat swampy plains, in parts of Malaya and Sumatra, the problem of making reliable foundations is often accentuated.

One difficulty frequently experienced, especially when artificial heating apparatus is not employed, is that of getting a good supply of cool air through the building. This defect is often due to the site not being at a sufficient altitude and to the building being closely surrounded by forest trees of the Hevea type. A site sufficiently large and free from trees is therefore desirable. In gently undulating country a slight altitude is all that is required to ensure a good circulation of air through the building.

TYPES OF FACTORIES REQUIRED.

The type of factory to be erected depends upon many conditions, such as the amount of the crop and the method of curing and washing.

In order to meet crop requirements, care should be taken to ensure that extensions can be easily and economically made from time to time. This is particularly the case where small and similar acreages come into bearing regularly each year for many years in succession. Where the whole of the area is in bearing, the building need not provide for extensions to the same degree, though an annual increase in yield per acre must be allowed for.

The method of curing also has a bearing on the type of factory required. If vacuum driers are used, the size of the factory can be reduced. If artificial heating apparatus is provided, the rubber is dried more quickly, and less space is therefore required in the curing section. The installation of heating apparatus, fans, etc., generally necessitate the erection of a two-storey building. Smoking must also be considered, though in many cases a separate building is erected for this phase of the curing process Frequently, however, the rubber is smoked, while being cured, in a part of the factory permanently set aside for this work.

The kind of washing machine and position of shafting must also be considered in the erection of the walls and floor of a factory. There are some washing machines which have double or treble the working capacity of others, and which demand comparatively less space. Shafting, if overhead, may require wall brackets, which frequently necessitate an entirely different construction. Floor shafting, on the other hand, may be erected more or less irrespective of the materials used in the construction of the building.

TYPES NOW USED ON PLANTATIONS.

Though in the types of factories now used on plantations there is considerable variation, there is some ground for hoping that standardisation will utimately be recognised. If rubber plantation factories were standardised, the cost would be appreciably lessened, and additions more easily made. A width of forty feet, with bays ten feet, has been suggested (Davidson, Souvenir, I. R. J.) as the standard to adopt.

On Eastern estates the factories are either: (1) entirely on ground floor, (2) two-storeyed (or more) throughout, or (3) two-storeyed only in the curing section. They are provided with a space for the engines inside the factory, or a separate building adjoining the factory is reserved as the power station.

Materials used in Construction.

Most factories are steel-framed and covered with galvanized corrugated iron sheets. Where the roof is not provided with a timber ceiling, the air is apt to get very warm in the tropics. The sides, or walls, are usually made of corrugated-iron sheets, similar to those used for the roof. On some estates timber is sometimes favoured, in which case it is advisable to use wood which has been impregnated with creosote, in order to preserve it against the attacks of white ants. Brick walls, between the iron columns, are not often erected, though they are always cool, durable, and neat.

Ventilation of Factories.

Apart from health reasons, there are many others why rubber factories should be well ventilated. Rubber contains a proportion of putrescible matter, and if the air is not kept pure, bacteria may appear in large numbers and lead to deterioration of the rubber during curing. Furthermore, drying is, even in dry weather, expedited if a good draught of fresh air is maintained through the building. The majority of factories rely upon open windows and doors, together with a fan, for their supplies of fresh air: expanded metal, which is so constructed as to allow of air currents, is now used, near the eaves or floor level.

Floor of Factories.

The ground-floor is, for durability and cleanliness usually made of cement. It is, however, not uncommon to find white ants boring their way through thin layers of cement, and it is therefore necessary to see that this work is properly executed. In order that water may be carried rapidly away from the washing machines and drip racks, channels should be freely provided. The floor requires containing some cheap disinfectant and it is therefore necessary to construct it with a slope of, say, one in eighty, to hasten drying.

Where one-storey buildings are installed with artificial heating apparatus, a timbered floor is often necessary. This may be provided with spaces for the passage of air, and be raised above the level of the ground to enable steam or hot-air pipes to be laid and to create a hot-air chamber in this region.

Light and Windows in Factories.

The bad effect of light on rubber, and the necessity of having abundance of light in the machinery sections, necessitate the adoption of a different arrangement in various parts of the factory. There can hardly be too many windows near the engines and washing mills. These should, therefore, be provided and constructed so as to open inwards for draught purposes.

In the curing room, however, windows must either be supplied with red glass, or curtains, to stop the chemical rays from reaching the rubber, or with wooden or corrugated-iron doors—which can be opened from the inside to allow light to enter during inspection of the rubber. It is necessary that the rubber in the curing room be frequently inspected in order that the development of moulds and tackiness may be arrested in the initial stages; hence the desirability of having even the curing room well supplied with light under control.

Doors and windows should, whenever possible, be made to close on the inside in order that draughts of fresh air can enter the building without check.

Timber in Factories.

It is not only necessary that all timber used in the factory should be well seasoned to avoid warping, and of the most durable kind, but it is also advisable to protect it in every possible way against wet and dry rot, and various pests.—*India-Rubber Journal*.

The Planters' Chronicle.

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(INCORPORATED.)

The Scientific Officer.

Mr. R. D. Anstead, B. A., finds it necessary to visit North Mysore this month. He will, therefore, leave head quarters on the 19th instant for Kadur and return about the 26th idem. As the Annual Meeting of the North Mysore Planters' Association will be held at Balehonnur on the 22nd instant, he will avail himself of the opportunity of attending it.

The Imperial Entomologist.

Mr. T. Bainbrigge Fletcher, R.N., F.E.S., F.Z.S., was in Bangalore on the 7th and 8th instant, and paid a visit to the U. P. A. S. I. office.

The U. P. A. S. I. Exhibition.

Hon. Secretaries of District Planters' Associations have been requested to record their votes as to the desirability of holding another Exhibition in connection with the Annual Meeting, 1912; and have been asked, if they think an Exhibition should be held, to kindly make arrangements to assure a good show of planting products from their respective districts.

Early notice is necessary with respect to this matter, more particularly as regards Coffee, which product has been somewhat poorly represented in the past owing to the bulk of supplies having been despatched from estates before definite arrangements for the holding of Exhibitions were made.

The Cochin Exhibition.

The Cochin Rubber Co., Ltd., was awarded a silver medal at the recent Agricultural and Industrial Exhibition held in Trichur, Cochin State. Many Rubber Estates competed. The rubber from the Cochin Rubber Co., Ltd., was reported on as being of very excellent quality, and was beautifully cured. Great credit has been given to the Manager, Mr. R. de Roos Norman.

The Chrome Leather Co.

These advertisers have sent in a very neat Calendar for 1912 and a well arranged price-list. "From raw skin to finished boot" is one of their watchwords, and it is amplified by another: "Anything made from *any* Leather." The price-list certainly includes various other articles besides Boots, and the range of "manufactures" is very comprehensive. Illustrations of portions of the Company's workshops are also given, and these point to manufacture on a large scale and under economical conditions. As to the quality of the products many of our readers will no doubt judge for themselves. They may be assured that "back of the business" (as our American cousins say) there are brains, enterprise and unflagging energy, which must count for a great deal in an industrial struggle for supremacy.

Scientific Officer's Papers.

LXXXVIII.—TOUR IN THE ANAMALAIS.

From 20th to 29th January, I made a tour in the Anamalais and had the pleasure of being accompanied by Mr. T. Bainbrigge-Fletcher, R. N., F. E. S., the Acting Imperial Entomologist at Pusa. Mr. Fletcher has been appointed Entomologist to the Government of Madras and will, during the course of the year, join the staff at the Agricultural College at Coimbatore, when it is hoped that we may see more of him. Being at Coimbatore to make arrangements about his new duties there I thought it an excellent opportunity to get Mr. Fletcher to accompany me on this tour, and the Government consented to his doing so. Mr. Fletcher occupied most of his time in collecting work and secured specimens of many interesting "poochies." He is especially occupied upon the study of the "White Ants" of India and he found at least five different varieties in the Anamalais.

I visited the district exactly a year ago and have not much to add to the report I wrote then, which will be found in the *Planters' Chronicle*, Vol. VI, p. 88. The experiment with Nitrolim described there has been completed, and it must be admitted that no striking result is noticeable. The coffee to which it was applied, however, bore a good crop and looks well, and it must be remembered that if Nitrolim gives only the same result as Nitrate of Soda it is a much more economical fertiliser per unit of Nitrogen. Moreover I believe that there is a prospect of this fertiliser being manufactured in India in the near future, which should still further lower its cost.

A mixture of 2 parts of Superphosphate to 1 part of Sulphate of Potash applied at the rate of about 3 ounces per tree after the monsoon and following a dressing of Poonac early in the year was recommended with the object of helping the trees to hold and ripen up a big crop, and this appears to have given satisfactory results.

A compost made from Coffee pulp, yard and line sweepings, etc., was made on one estate in one of the washing tanks. This did no harm to the tank and supplied a quantity of good manure, which was applied at the end of the year. Samples of this compost have been obtained, and the analysis will be published in due course with that of similar composts made in other districts.

Such composts will undoubtedly prove valuable and economical and on light sandy gravelly soils like those of the Anamalais will be especially beneficial. The compost should be made in a watertight tank of some kind and consist of layers of pulp, line and yard sweepings, and all the refuse of the estate which cannot be used in any other way. When coffee is being sent away and the yard is full each week end of bandies a large amount of valuable material can be collected which should be put on the compost heap and mixed with the pulp to rot down instead of being wasted or at most swept up and thrown into the Coffee. If a little powdered bone is added to the compost heap from time to time at the rate of about a cwt. for each ton of compost, the final mixture will be still more valuable.

A caterpillar was found eating the leaves of the young Cardamoms in one place. Should this become a really serious pest a spray of Lead Chromate will check it. Details of this insecticide will be found in the "*Planters' Chronicle*," Vol. V, page 79. Another insect which attacks cardamoms is a borer which feeds in the stem and bores out the centre of it. This is the larva of a moth, and the only remedy is to cut out all the stems attacked and burn them so as to destroy the prospective moths and prevent them laying eggs.

The Ceará Rubber in the district is making a remarkably rapid growth and should prove a valuable asset. Systematic tapping on some approved system over a measured area containing a known number of trees, throughout the whole of a tapping season is needed in order to discover what the yield is and the cost of production, and to act as a starting point for any methods of improvement. All bad trees which fall far behind the average latex yield should be removed and the stumps pulled up to avoid stump rot, to which Ceará is very susceptible, and if necessary supplies put in grown from seed or cuttings taken from selected good yielding trees. The tree grows so rapidly that this method can safely be adopted.

It was mentioned in last year's report that some of the Tea nurseries had been attacked by a *Fusarium* fungus which had caused a good deal of damage. This year my attention was called to another disease in a Tea nursery. Plants turn yellow and die when about six inches high. Careful examination of the diseased seedlings under the microscope shows that they are attacked by Eelworms. This is a pest which does a great deal of harm from time to time to a large variety of plants both in the Tropics and in Europe. Dr. Barber, the Government Botanist, Madras, investigated an attack of Eelworm in Tea nurseries in the Wynaad in 1905 and he published a report on it in *Vol.* 11, *Bulletin 45 of the Agricultural Branch of the Department of Land Records and Agriculture, Madras.* The subject is of sufficient importance to warrant a separate paper, and in the next issue of the *Chronicle* I shall hope to quote at length from Dr. Barber's report and suggest certain remedies and precautions which should be adopted to check the pest.

The sincere thanks of Mr. Fletcher and myself are due to the planters of the district for their hospitality, and to Mr. Marsh for generous help with our transport arrangements, and I would take this opportunity of expressing my regret at the Honorary Secretary, Mr. Congreve's illness and to wish him a speedy recovery.

RUDOLPH D. ANSTEAD, *Planting Expert.*

In an interview with a representative of the *Times of Ceylon* after his visit upcountry Dr. Jacques Huber stated that he and his companions had only had time to carry out their investigations in a general sort of way.

Asked if he had studied on Deviturai the tapping by the improved Northway System, Dr. Huber replied in the affirmative, and said he thought it was a really good system and would be very successful. It saved bark.

As to the methods in vogue in Ceylon, they were, of course, very different to those in Brazil. He had read about them in publications, and was very glad to have had the opportunity of seeing them for himself. He was astonished at the good growth of the tree in Ceylon, which, however, could not be considered better than in Brazil. Perhaps, they in Brazil could get a better growth than was possible in Ceylon if they could apply the same scientific aids of weeding, manuring, &c. The tree could grow well under such conditions even in a climate which was, perhaps, not so favourable as that of Brazil. He was struck with the healthy appearance of the trees in Ceylon. In a general way, he could say that Ceylon men were still planting too closely, although he had seen estates—one particularly, near Ruanwella, planted by Mr. Forsythe—where the trees were planted at better distances. For instance, 24 feet to 28 feet—70 trees to the acre. He saw smoking done at Matale—at two places; in fact—but gathered the impression that smoking was not being taken up generally. The planter seemed to prefer making light crepe, from the latex, which was a favourite in the market at present. Scrap they were inclined to smoke.

THE PLANTER'S LIBRARY.

Business Terms, Phrases and Abbreviations, with Foreign Equivalents.*

This book is not one that can be recommended as indispensable to the planter's library, but it would certainly make a useful addition to such libraries in many cases and would probably be particularly useful to estate writers. It has reached the stage of a "fourth edition, revised and enlarged," the "foreign equivalents" now embracing Italian, in addition to the French, German and Spanish of earlier editions.

It is a very comprehensive little volume, the number of terms, &c., explained being legion; but all these explanations are not equally good. For example, against the term "Bill of Lading" there is the following entry:—"A printed form of receipt given by the brokers or owners of a vessel, for goods which have been received on board, and an agreement as to their delivery, freight, etc. It specifies the ship's name, the shipper's name, the port of destination, the number or weight of goods shipped, their marks, the agreed conditions concerning freight and primage, and the name of the person to whom the goods are to be delivered."

Against the term "Letter of Hypothecation" the following appears:—"When a banker advances money against a bill of lading on security of the shipping documents, a Letter of Hypothecation is given to the banker, which gives him a lien on the goods specified in the bill of lading, and against which the advance is made. The property in the goods remains in the hands of the debtor."

It will be observed that the reader is told the special "heads" with which the first of the above documents should deal, whereas in the case of a Letter of Hypothecation the definition is much less precise. The value of all definitions of the kind would be enhanced if they were framed according to a uniform, well considered system, so as to give all information likely to be required by readers.

Again, the term "re-draft" has acquired in commercial usage a wider meaning than is attached to it in this book.

A question might be asked as to the reason why it has been thought necessary to include "Co-respondent" in the list of terms dealt with. It can scarcely be regarded as one of those "used in general mercantile practice."

Still, too much is doubtless better than too little. Indeed, in the face of the book's general excellence and its wide scope, it would be unfair to lay great emphasis on minor defects, if such they may be called, like those pointed out here. There are, it may be added, numerous useful illustrations and insets, the latter mostly giving copies of forms in general use—account-current, debenture, invoice, share certificate, &c., &c. Some instructive diagrams of Cheque Crossings also deserve particular mention, and a long and useful list of Abbreviations appended to the book will prove very valuable for reference.

**Pitman's Commercial Series.*—BUSINESS TERMS, PHRASES AND ABBREVIATIONS with Equivalents in French, German, Spanish and Italian, and Facsimile Documents. Fourth Edition, revised and enlarged. *London*:—Sir Isaac Pitman & Sons, Ltd., Price 2*s*. 6*d*. net.

DISTRICT PLANTERS' ASSOCIATIONS.

Bababudin Planters' Association.

A Quarterly General Meeting was held at Santaveri on January 24th, 1912.

PRESENT.—Messrs. Denne (President), Boyd, Hugonin, Johnson, Kerr, and Kirwan (Honorary Secretary).

Minutes of the last Meeting were read and passed.

CEYLON RECRUITING AGENCIES.—The Ceylon Labour Commissioner's reply to the resolution passed at the U. P. A. Meeting contained in U. P. A. Circular No. 72/11 was read. The Honorary Secretary was instructed to write and thank the Ceylon Labour Commissioner for the prompt way in which the newly established Agencies on the Southern Mahratta Railway were closed.

ROADS.—The reply of the Executive Engineer to the request for the Santaveri road being given on a Lump Sum Contract was read. The Executive Engineer being agreeable to the Lump Sum Contract being given for a period of three years, Messrs. Kerr and Hugonin have consented to take up the road. It was decided to postpone discussion on the road wanted by Mr. Courpalais until the correspondence on the subject has been received from the N. M. P. A. as promised.

SANTAVERI SUNDAY DISPENSARY.—The Honorary Secretary was directed to address the P. M. O., Mysore, pointing out the inconvenience caused by the closing of this Dispensary and to ask for its re-establishment.

M. & S. M. RAILWAY UNLOADING CHARGES.—The Honorary Secretary was directed to write to the Railway Authorities and point out that up till 1911 no unloading charges were levied in the planting districts on manure, but that since May last the unloading charges levied at Birur Station have risen as high as Rs.5-2-0 per waggon, recently charged one member of this Association, and to request that the same consideration might be shown this District as formerly.

PROPOSED COUNCIL OF MYSORE ASSOCIATIONS.—Letters from the North and South Mysore Associations agreeing to this proposal were read. The Honorary Secretary was instructed to proceed in the matter.

LABOUR RULES.—The views of the members present on the proposed draft of rules were ascertained. It was decided to leave the matter with the Committee who were requested to attend the proposed meeting with the other Mysore Associations on the matter.

(Signed) NOEL G. B. KIRWAN,
Hon. Secretary.

ARSENATE OF SODA AS A WEED KILLER.

Mr. William Williamson, speaking recently at a meeting of the Hawaiian Rubber Growers' Association, said that on Hawaii rubber plantations, with a view to keeping the land cleared for rubber planting clean and in condition, they sprayed the ground with arsenate of soda. At first they doubted whether it was wise to apply this powerful preparation over considerable areas, for fear of damaging the trees; but in practice no harm resulted. Some of the lands treated in this way are now so free from grass and weeds that they require no more attention.

CORRESPONDENCE.

Labour Problems.

Sir,—I stand corrected. I now understand from Mr. Brock's letter of the 18th instant that the Anamalai Planters' Association bow to the inevitable about Legislation in Labour matters, but wish the U. P. A. S. I. to take up a strong line of action against unprincipled methods of recruiting. As long as there are unprincipled men in the world, any line of action, however strong, will fail. During my struggle for existence it is my experience. I say "however strong" in a practical sense, because I leave out of count hanging and such like methods, which are radical cures. The A.P.A. has shown us the enormous amount of money available for the purpose we all have at heart. The reason why the A. P. A. does not use its own share is, I suppose, that individually they think it not worth while, but as a contribution to a united effort or organization, they would pay up. This falls in with stories of our childhood about the weak single faggot and so forth. It is quite true that my idea is to leave every District, and each unit in its own district, to work out its own salvation, but it is quite possible for each district and each unit, while doing so, to fight against the evils we complain of, in Emigration at any rate. We would have a large number of individuals all aiming from different directions at a single point, and this unity of aim, is preferable to my mind than a single organisation governed by diverse interests, and therefore hampered in its action, endeavouring to fight against the multiple forces arrayed against us. Their strength lies in their multiplicity and not in their unity, at least so I have found it. As regards selfishness, I admit it. As regards other subjects in planting politics, I leave them to those who understand them ; if it is shown that united effort is necessary to overcome them, I have no doubt I shall be persuaded accordingly, supposing I survive.

I am afraid I am going on in my glib way, Mr. Editor, but really I thought every one understood that advertising was only one means to an end, and not an end in itself. It was only when your Madras contemporary mentioned the matter that I saw the possibility of others also not understanding my proposal. It is true I have studiously avoided the question of "follow up," and it is one which the A. P. A. would have failed to thrash out with me, had I consented to meet one of its members in Conference. The failure would not have been the fault of the questioner, but it would have been owing to my selfishness. To give up to mankind all that one possesses is no doubt a noble sentiment, but other considerations exist. Was I wrathful with the A. P. A. for its threat? Wrath implies a certain amount of warmth, I remember distinctly however, that it left me cold. But cheer up! Mr. Brock, one district at any rate is content to work on its own and still support the U. P. A. S. I., although the two things seem incompatible to the A. P. A.

I have admitted so much that Mr. Brock has urged against me, that I really must proceed to show a little fight. He asserts that the most perfectly arranged attractions to labour will not check questionable methods of recruiting, to which I reply that when he has established perfectly arranged attractions to labour on his Estate, he will not mind questionable methods of recruiting by others. They will not affect him, and if he hears of them at all, it might even afford him satisfaction if he has any selfishness at all in him, which I doubt. On the very next page to Mr. Brock's letter is an account of the Committee Meeting of the Planters Association of Ceylon, and the first clause of the report adopted says *that the emloyment of the professional recruiter has done and is doing harm to Ceylon and that he must be done away with at all costs.* It will be noted that the professional recruiter is to be done away with *at all costs*, not because of any tender regard for South Indian Planters, but simply because it has recognised by Ceylon Planters, that the methods of the professional recruiter are doing harm to themselves. Selfish fellows!

I shall have to stand much more, I know, in the way of banter, because I proposed a resolution asking for Government Legislation, and the following year repudiated it. The disavowal of my former faith appears in cold print in the last book of proceedings, but I take this opportunity of again acclaiming it. Having turned my coat, I display the fact fully. With equal cheerfulness I announce that the very moment I am convinced that I am in error, I shall turn it back again, or adopt another, as the circumstances of the case demand.

Now Mr. Editor, you must be tired of my shallowness, glibness, wrathfulness, and other sins, but I must ask you to allow me through the medium of your kind offices to thank the writers of the numerous letters I have received from my planting brethren agreeing with the views set forth in my last letter. To-day I had time to write to each separately, but alas! this present screed has deprived me of the pleasure. In conclusion, Mr. Brock's final advice, I repeat:—*Converge* on one point and the problem will cease to trouble.

(Signed) AYLMER MARTIN.

Srivilliputtur, 30th January 1912.

Fruit Blossoms, Bees and Weather.

Some months ago Mr. Cecil H. Hooper. M. R. A. C., South-Eastern Agricultural College, Wye, Kent, contributed to the *Estate Magazine* a paper on the above subject. Some of the information it contains concerning the work of bees in the pollination of fruit blossoms, will interest planters out here.

The weather during the blossoming period exerts both a direct and indirect influence on the setting of fruit. . . . Moderate cold renders the "self-fertile" trees "self-sterile"— that is to say, the seeds and fruit do not mature when pollinated with pollen from the same variety of tree—and severe cold renders them sterile to cross-pollination as well. Warm and sunny weather at blossoming time indirectly aids the fertilisation by favouring and aiding insects in their work of cross-pollination. An excessive degree of humidity favours fungous diseases, which may destroy either the blossoms or the young fruit. Dry winds on the other hand reduce the flow of nectar to almost nothing and probably cut down the stigmatic secretion, and so interfere with the setting of the fruit. . . . For these various reasons fruit will not set unless a reasonable amount of warm, sunny weather occurs during flowering time. The vitality of a tree is often injured and young fruit often killed by fungous diseases which destroy the flowers and the foliage. . . . Again the amount of fruit a tree bears one year generally determines the yield the following year, and sometimes all possibility of a crop is cut off by the trees failing to bloom. . . .

Honey bees and other members of the bee family are the best workers in cross-pollination, though some other insects assist; thus ants will sometimes pollinate strawberries, and Professor F. V. Theobald tells me that black midges do much in the pollination of pears. Some fruits, . . . if protected from bees will set practically no fruit, as by the construction of the flower and the adhesiveness of the pollen mechanical means are necessary to carry the pollen to the stigmas. Many other trees . . . need, in order to set fruit, that their stigmas be pollinated with pollen from a different variety of the same kind of fruit.

TEA.

The Chemistry, Physiology and Aesthetics of a cup of Tea. Caffeine Tannate as the Chief Constituent of Tea Infusion.

The following is quoted from *The Lancet* of December 2 :—The view that caffeine exists in an infusion of tea in the form of a definite compound with tannin is sustained by further experiments. In a previous article upon the subject it was shown that when an infusion of tea (which always exhibits an alkaline reaction) was acidified with any acid a flaky buff-coloured precipitate settled out, especially in the cold, which proved to contain chiefly caffeine tannate. Further, the proportion of caffeine to tannin in this precipitate was found to be 1 of the former to 3 of the latter, and the suggestion was that the compound consisted of 1 molecule of caffeine $C_8H_{10}N_4O_2$, with a molecular weight of 194, associated with 1 molecule of quercitannic acid $C_{28}H_{26}O_{15}$ with a molecular weight of 602. In the previous article the formula was wrongly given as $C_{20}H_{20}O_9$. The ratio of caffeine to tannin in such a compound would be 1 : 3·1. The following is an example of the analysis of this precipitate from a good Indian tea :—

Caffeine	20·93	per cent.
Tannin	62·80	„
Resinous and oily matters (by difference) ...	16·27	„
Total ...	100·00	„

The precipitate amounted to 9·84 per cent. of the tea used in the infusion. A further experiment gave the following results :—

Caffeine	20·89	per cent.
Tannin	62·66	„
Resinous and oily matters (by difference) ...	16·45	„
Total ...	100·00	„

It follows that the precipitate obtained on making an infusion of tea acid consists principally of caffeine and tannin in the ratio approximately of 1 of the former to 3 of the latter. The presumption is that caffeine tannate is the chief body thrown out of solution by the addition of acid. When, however, this precipitate is removed by filtration and the filtrate is saturated with ammonium sulphate a further separation of buff-coloured flakes takes place.

On analysis this flakes show the following composition :—

Caffeine	24·13	per cent.
Tannin	75·80	„ „

$$\frac{\text{Tannin}}{\text{Caffeine}} = 3·14$$

The ammonium sulphate precipitate amounted to 4 per cent. of the tea used in the infusion (5 grammes in 409 cubic centimetres of just boiling water allowed to stand five minutes before pouring off). Calculation shows that this particular tea yielded a total of caffeine tannate of 12·26 per cent. Of this total 8·26 was thrown out by mere addition of acid and 4·00 per cent. by subsequent saturation of the filtered acid infusion with ammonium sulphate. There is no point in separating caffeine tannate first by acidifying and next by saturating with ammonium sulphate. The whole can be thrown down at once by adding ammonium sulphate after acidifying the tea infusion with dilute sulphuric acid. When this precipitate is air-dried and sunk in a mixture of 1 of alcohol and 2 of benzine the caffeine tannate is separated from the excess of ammonium sulphate crystals and resins and obtained in a comparatively pure state. The solution of caffeine tannate in benzine-alcohol mixture readily yields its tannin to lead oxide (litharge), the caffeine being set free. To give an example, a certain tea (Indian) yielded a total precipitate by ammonium sulphate amounting to 11·60 per cent. when dissolved in benzine-alcohol mixture and evaporated to dryness and weighed. The following was the process:—A definite volume of the alcoholic-benzine solution of the caffeine tannate was evaporated over a weighed quantity of lead oxide. The dry residue was then made into a thick paste with water and extracted with chloroform, which was poured off and evaporated in a platinum basin. The residue from the chloroform represents the caffeine contained in the caffeine tannate. The wet lead oxide paste was then dried to constant weight and the increase of weight shown over the original amount of lead oxide weighed out was regarded to be due to tannin. In this way a residue of 11·60 per cent. obtained by evaporating the alcohol-benzine mixture to dryness gave on treatment in the way just described:—

Caffeine ...	... 2·80 per cent.
Tannin ...	... 8·80 „
Total (caffeine tannate	... 11·60 „

With another tea the total caffeine tannate extracted from the ammonium sulphate precipitate by benzine-alcohol mixture was 12·80 per cent., and the constituents found by lead oxide separation were:—

Caffeine ...	... 3·20 per cent.
Tannin ...	... 9·60 „
Total (caffeine tannate)	... 12·80 „

These experiments thus appear to establish that, complex as the composition of an infusion of tea may be, it at least yields a definite substance in the shape of caffeine tannate, the composition of which is constantly shown to be one part of caffeine with three parts of tannin.

. . . . . We have already shown that to a large extent the teas which are regarded as of high quality by the merchant prove to yield infusions containing caffeine and tannin in the ratio of 1 to 3, and the strong inference is that such infusions contain neither free tannin nor caffeine, but neutral caffeine tannate. The merchant's view of quality would thus appear to accord quite happily with physiological considerations. He is guided, of course, chiefly by the flavour of the infusion, as well as by colour and odour and general appearance. Both tannin and caffeine in the free state have characteristic tastes: the former is astringent and sour, the latter is bitter. A slight excess of caffeine in tea infusion is probably less objectionable than an excess of tannin, since the disagreeable qualities of tannin are more marked. An ideal infusion is one which contains both caffeine and tannin in 1 to 3 proportion—*i.e.*, caffeine tannate—neither constituent being in excess. This ideal is occasionally reached, but, generally speaking, most good teas contain caffeine in slight excess. Caffeine tannate, however, does not possess the qualities of its constituents, it has a peculiar flavour which is smooth and bland, not unlike a very delicate or lightly infused tea. It must be carefully borne in mind that in making these deductions we are not considering the chemistry of the leaf, but of its infusion made by pouring 400 c.c. of just boiled water upon 5 grammes of tea and decanting after 5 minutes—a plan suggested by the tea-taster's method of assaying tea.

THE EFFECT OF "STEWING" SOME TEAS.

The desirable equilibrium may be disturbed by vicious treatment even of a good tea. If an Indian tea be boiled long enough or stewed on the hob a point is reached when tannin appears over and above the amount which can combine with the caffeine to form neutral caffeine tannate. Such an infusion presents the objectionable characters of tannin. When this infusion is saturated with ammonium sulphate the caffeine tannate as such is thrown out. If this is filtered off the excess of tannin will be found in the filtrate, from which it can be extracted by ethyl acetate. Thus the five minutes' infusion of an Indian tea showed a total tannin content of 9'24 per cent. and caffeine 3'70 per cent. On infusing the same tea for one hour the tannin amounted to 16'12 per cent. and the caffeine 4'40 per cent. In the five minutes' infusion, therefore, caffeine was in slight excess (0'38 per cent.) of the tannin, but in the one hour's infusion the tannin is in excess of the caffeine by 2'92 per cent. In other words, 4'40 of caffeine if combined as tannate, would mean in the combination 13'2 of tannin, when as a matter of fact the total tannin found was 16'12 per cent.

The experience of making wholesome tea seems to have decided upon a limited time for making the infusion. This limit, in fact, appears to us to insist upon the infusion consisting as far as possible of caffeine tannate and upon the exclusion of an important quantity of free tannin or caffeine present. But even a five minutes' infusion of some teas may not approach this standard. Indeed, in view of our work upon the subject we are able to suggest a

CLASSIFICATION FOR TEAS AS FOLLOWS:—

Good teas are those which on a five minutes' infusion yield only caffeine in the form of caffeine tannate to the infusion, neither caffeine nor tannin being in excess; and bad teas are those which yield on infusion for five minutes, a tea containing in addition to caffeine tannate either caffeine or tannin, but especially tannin, in excess.

It is obvious from this classification that a good tea may be made a bad tea, but a bad tea cannot be made a good tea, except possibly by very skilful blending. Excessive infusion will spoil a good tea, but a short infusion of a bad tea may be as objectionable as an excessive infusion of a good tea. On physiological grounds, therefore, the buyer of high-quality teas runs less risk of digestive disturbance provided he makes the tea properly.

These points are interesting in connection with the light types of tea grown in China. The short infusions of these teas commonly contain an excess of caffeine, which probably accounts for their bitterness. They are less rich than Indian teas, a fact which should make the use of Indian teas more economical, but the best types of them never show the presence of free tannin. A five minutes' infusion of a certain China tea showed a total amount of tannin of 4'60 per cent. and caffeine 2'80 per cent. On the basis of the 1 to 3 relationship of caffeine to tannin in caffeine tannate it is evident that in this tea there is an excess of caffeine—*viz.*, 1'27 per cent. for the amount of caffeine that can combine with 4'60 of tannin is 1'53, making a total of 6'13 per cent. of tannate. As a matter of fact, the amount of caffeine thrown out as tannate when the infusion was saturated with ammonium sulphate was 6'48, which inquires 1'62 of caffeine and 4'86 of tannin. In the five minutes' infusion, therefore, there was 1'27 per cent. of caffeine in excess. On infusing the same tea for an hour, however, the tannin then amounted to 7'14 per cent. and the caffeine to 3'20 per cent. Caffeine is still in excess, for the amount combined as tannate is 2'38 per cent., giving a difference of 3'2-2'38=0'82 per cent. Some China teas, therefore, are incapable of yielding free tannin, and these are invariably high-priced teas.

ANALYSIS OF INFUSIONS OF VARIOUS TEAS.

In the following table will be found a series of analyses of infusions made with India, Ceylon, and China teas respectively. The percentage results are based upon 5 grammes of tea used in the experiment, to which were added 400 c.c. of just boiling water, the infusion being poured off after five minutes. The qualities of the teas from the merchant's point of view are indicated by the brokers' prices which are attached:—

Analyses of Infusions of Various Teas.

Description.	Caffeine tannate determined.	Tannin combined with caffeine*	Caffeine combined with tannin*	Total tannin determined.	Total caffeine determined.	Caffeine not combined with tannin.	Tannin not combined with caffeine	Brokers' price per pound. s.	d.
Indian ...	8·54	6·41	2·13	6·80	2·56	0·43	0·39		7½
do. ...	8·88	6·66	2·22	5·88	2·22	...	...		8
do. ...	10·32	7·74	2·58	7·39	2·88	0·30	...		8¼
do. ...	11·48	8·61	2·87	8·41	3·52	0·65	...		8½
do. ...	13·28	9·96	3·32	9·24	3·70	0·38	...		10½
do. ...	9·60	7·20	2·40	8·73	3·20	0·80	1·53		11½
do. ...	12·50	9·40	3·10	9·50	4·00	0·90	0·10	1	10½
do. ...	13·36	10·02	3·34	10·92	4·32	0·98	0·90	1	10½
Ceylon ...	8·88	6·66	2·22	6·30	2·80	0·58	...		8½
do. ...	9·12	6·84	2·28	7·14	3·04	0·76	0·30		10½
do. ...	10·40	7·80	2·60	9·82	2·96	0·36	2·02		10½
do. ...	11·76	8·82	2·94	8·82	2·96	0·02	...		10½
do. ...	13·28	9·96	3·32	9·66	4·00	0·68	...	1	1
do. ...	12·00	9·00	3·00	8·40	3·60	0·60	...	1	4
China ...	5·36	4·02	1·34	3·02	1·92	0·58	...		6½
do. ...	5·60	4·20	1·40	4·87	2·72	1·32	0·67		8
do. ...	7·60	5·70	1·90	5·04	2·72	0·82	...		9½
do. ...	6·32	4·74	1·58	3·96	2·72	1·14	...	1	1
do. ...	6·48	4·86	1·62	4·60	2·80	1·18	...	1	5

* Calculated.

It will be noted that, as a rule, the high-priced teas yield infusions containing a balance of tannin and caffeine and in general a larger amount of these constituents. The use of a high quality tea is therefore not only salutary but economical also. A very fine example of Indian tea is No. 7. The infusion contained as much as 4 per cent. of caffeine and 9·50 per cent. of tannin. There was only 0·1 per cent. of tannin uncombined with caffeine and 0·90 per cent. of caffeine uncombined with tannin. The price of this tea was 1*s*. 10½*d*. per lb. On the other hand, Indian tea at about half the price—11½*d*.—gave 8·73 per cent. of tannin and 3·20 per cent. of caffeine, and there was 1·53 per cent. of tannin not combined with caffeine, and the liquor was accordingly harsh and astringent, although the time of infusion was only five minutes. The same applies to the Ceylon teas; a tea quoted at 1*s*. 4*d*. per lb. yielded no tannin over and above what is combined as tannate, while one tea quoted at 10½*d*. gave 2·02 tannin in excess. The tea at 1*s*. 4*d*. again yielded 3·60 per cent. of caffeine, while the tea at 10½*d*. gave 2·96. Ceylon teas, as a rule, show a more regularly balanced composition as regards the ratio of tannin to caffeine (3 to 1), a finding which would seem to show that Ceylon teas are all that can be asked from a physiological point of view.

When we come to China teas there is again seen to be some relation between price and the percentage of caffeine. A cheap China tea, for example (6½*d.* per lb.), gives 1·92 per cent. of caffeine, while one at 1*s.* 5*d.* per lb. yields 2·80 per cent. China teas, again, rarely yield an excess of tannin, but nearly always an amount of caffeine in excess of tannin, and caffeine appears to occur in China tea with some constituent other than tannin.

BLENDS AND THE BEHAVIOUR OF TEA WITH DIFFERENT WATERS.

So far we have been dealing with individual teas, but we now come to a consideration of blends. The aim of the blender is, of course, to produce a palatable tea and, more than that, to mix individual teas so that the whole shall be adapted to the peculiar requirements of different public water supplies. In doing this, does he unconsciously produce a mixed tea in which, whatever the drawbacks of the individual teas may be, a balance of caffeine and tannin somewhere near the ratio of 1 to 3 is effected? It is well known to tea experts that a tea which produces a pleasant palatable infusion with London water may easily be uninteresting or even possibly bad when made with, say a very soft peaty water in Dublin or with the soft-water supplies of Plymouth, Aberdeen, Swansea, and elsewhere. The consumer has the same experience. He will have made up his mind after considerable trial that a certain tea in his judgment is best, at any rate at home. So convinced is he that the tea is a good one that when he happens to travel he will take care to have the same tea with him only to find out that outside his own district at home the tea becomes indifferent. In other words, he has found a tea which associates perfectly with the home supply of water, but which proves to go badly with waters of different quality. Hence the taster will always be careful to select a tea suited to a particular place, and it is invariably his plan to be sure of this by testing the tea with the actual water supplied to the neighbourhood for which the tea is required. It is difficult to see here what guides him in this matter, except it be flavour. The probability is that rich teas are more suitable for soft acid waters than for chalky waters. We know, at any rate, that an acid water will tend to neutralise the alkaline salts in tea which keep tannate of caffeine in solution; it would tend to throw caffeine and tannate in the form of tannate out of solution, and so weaken the infusion, whereas chalky water would have the opposite tendency and draw closely upon the available tannin and caffeine which are present in the form of tannate. This is a mere suggestion which may find little support in practice, but so far as we have examined blends deemed to be suitable for certain water, the choice appears to be in the direction we have indicated. Thus in a blend for consumption in Dublin where the water is soft and acid from the peat, the total caffeine tannate amounted to 13·20 per cent., the caffeine and tannin being approximately in the 1 to 3 proportion, whereas a tea supplied to districts in Scotland where the water is soft but not acid the total caffeine tannate amounted to 8 per cent., and a tea for Wales, where the water is again soft but not so acid as Dublin water, the caffeine tannate amounted to 10·40 per cent., while the blends supplied for chalky waters showed amounts of caffeine tannate varying from 10·4 to 11·60 per cent.

In all cases it is interesting to observe that the blends showed a near approximation to the ratio of 1 to 3 of caffeine and tannin as in caffeine tannate, and whatever the individual requirements of different districts may be, the taster seems to know when and how a combination of teas will give a satisfactory result. The varying alkalinity of teas may probably be a factor in the case. What exactly lies behind the choice of a tea to suit the requirements of different districts is a theme which is difficult to pursue on merely chemical grounds, for in addition to the varying chemical characteristics of different water supplies, there are colonies of people who collectively like a strong pungent liquor, while there are others who prefer their tea to be light and delicate in character.

The subject is by no means exhausted, but we submit that the foregoing investigation has thrown some new light upon the real character of tea infusion, especially in regard to correlating aesthetic with physiological considerations. We have not concerned ourselves at all with the chemistry of the leaf, but with the chemistry of the cup of tea, and in our inquiry we have been assisted by devising new methods of examination. We hope that other investigators will be induced to approach the subject from this standpoint.

COMMENT BY *The Grocer.*

"There is one point in particular which grocers might with great advantage bring before the notice of the public. Thus '. . . . the high-priced teas yield infusions containing a balance of tannin and caffeine, and in general a larger amount of these constituents. The use of a high quality tea is therefore *not only salutary but economical also.*' The article we have quoted bears striking testimony to the ability of the expert tea blenders. The latter, relying upon the practical methods of blending which are generally pursued, and upon their skill in selection and in tasting which years of constant and keen study have enabled them to acquire, arrive at results which scientific investigations have demonstrated beyond all doubt to be the best attainable. Our contemporary's commissioners . . . have rendered good service to the trade and the public by proving that in tea cheapness and economy are represented by fine quality, not by low prices; and it rests with the trade, who have suffered so much from the competition of so-called "best tea" at 1*s.* 4*d.* per lb. retail, to see that the public are properly educated upon this very important point."

China Tea in 1911.

The improvement in the delivery of China Tea for 1911 is most marked but, of course, it is principally due to the blenders having to use more of the common grades in their low-priced blends. However, there is no doubt that the middle and better-class people are being daily converted to the taste for good China growths, and it is probably only owing to its higher cost that consumption increases so slowly. If only the trade would not treat it as a fancy article, and retail it at the same profit they make on British-grown tea, the public could be supplied with a good tea at a reasonable price. The imports for season 1910-11 were 4½ million lbs. more than the previous season, partly owing to large imports from America of the lower growths in the spring, and which were attracted here owing to our market being higher than New York, where there was a plethora, for which they could not find a sale at any price. Demand, however, has been good, and each month shows an increase in deliveries over last year. Home consumption for 1911 shows an increase of 4 and 5 million lbs., while export has increased about 1 million lbs. The last three months of the year, however, show the most marked increase, owing probably to the very high prices ruling for common Indian and Ceylon leaf, and possibly partly to the country going more into stock on account of the fear of another "strike," as they were all terribly caught short during the railway and carmen's strike in the summer. Imports of Congou for season 1910-11 were nearly 15 million lbs. against 10 millions the previous season, but deliveries increased 3 million lbs. and we commenced the present season with a stock of 6½ million lbs. or 1 million lbs. more than the previous season. This season's crop from China may possibly be 2 to 3 millions more, but as it is not possible for

America to send us what she did early in the spring, the probability is we shall not receive any more than last year, while our deliveries are heavier. The salient points of the first six months of the year were large Russian orders for medium to finest Keemuns, owing to fears of the plague in China interfering with the new crop, purchases amounting to some 15,000 ½ chests, which was a godsend to this market. The constant demand on the part of the trade for all good Monings from 6*d*. to 9*d*. per lb., as well as Panyongs from 6*d*. to 1*s*., leaving the market quite bare by the end of the season. The large supplies from America (probably *2* million lbs.) of sweet common to fair Monings which were quietly absorbed from 5*d*. to 5¾*d*., with a falling market at the finish of ½*d*. and ¾*d*. per lb. on the better kinds without any ostensible reason, and many of which were turned over at ½*d*. and ¾*d*. per lb. profit after new seasons came in. Lastly, large shipments from Foochow of low common Oolongs (marked Panyong and common Fannings, all of which were not wanted, and have only lately been going into consumption, or at least finding a market possibly as a gambling counter. The first new season 1911-12 crop arrived on July 3 to be followed with larger shipments on the 10th, or a few days earlier than usual. However, so much is now sold on overland samples "to arrive" that there is not the same interest in the first arrivals. This season more than ever has been done "to arrive." Finest Keemuns, all the crack crops of Ichang, all the fine Soo Moos, and a fair quantity of the best Ching Moos were sold a month before their arrival and parcelled out amongst the usual buyers, while low priced Monings were also anticipated in thousands of ½ chests. The new crop from the North was reported as finer than last year, but in our opinion we do not find it as good, and with the exception of the Keemuns, which come down first, we find that most of the teas have a touch of the damp weather. The Foochow teas, on the other hand, were better all round and in very good condition. After the trade filled up their wants of all the better grades demand has been slow for the remainder of the year and values have not improved over, say, 7½d. per lb. Low-priced Monings were largely dealt in to arrive about 5½d. with fair grades at 6d. to 6½d., and from the opening sales they have steadily increased in value, and as we close the year we find these grades have gone up a full 1*d*. in value. At the start of the season we were left with a large quantity of Moning from New York, but the "strike" brought out their value, and they soon were all absorbed by the blenders as being the only tea available at the time. We finish up the year with virtually no available stock of low-priced tea under 6*d*. and quite a poor supply of fair to medium Moning or Panyong up to 7*d*. per lb. but no doubt the blenders have of late laid in a fair stock of the common grades of all kinds, and it remains to be seen where we are to get further shipments to carry us on until next June.—*The Grocer.*

In the Persian Caspian Provinces.

Mr. Vice Consul Robins reports:—As already mentioned in my last report the bulk of the tea trade is in the hands of a firm in Rostoff-on-Don. There are three transport companies in Russia who have the privilege of undertaking the transhipment from the Black Sea to the Caspian without having actually to deposit in Batoum the duties which are repayable on export from Baku. Thus all the merchants here bring out their tea through these transport companies. and by paying them a small fee are saved all the trouble with the Russian customs authorities. The transport people, in their turn, place all orders obtained with the aforesaid firm in Rostoff. There has of late, however, sprung up a tendency to import the tea direct from Calcutta, and thus save the various intermediary brokerages and commissions.

COFFEE.

Coffee in 1911.

From the producers' point of view 1911 was all that could be desired, prices throughout having been uniformly higher than in the previous year. To the trade, however, the course of events has been most unsatisfactory as the coffee has been altogether too dear for a reasonable working margin to be secured. Prices advanced persistently in the earlier part of the year, and although there have been subsequent fluctuations, they finish the year much above the average. As only to be expected, buyers for some considerable time past have exercised a good deal of reserve at such a dangerously high level of values, and while content to operate in order to fulfil pressing requirements the market has worn a rather sluggish appearance. Reduced supplies to handle, however, somewhat counterbalanced slackness of demand. Brazilian manipulation leading to tightness in such supplies caused buyers in the United States to turn their attention to Central American Crops, which tended to denude the London market, and enhanced the existing stringency. Quality of the East Indian crop was again poor, and the quantity shipped proved only about one-half that of the previous season, and upon the question of supply the same remark also applies to Central American growths. Although arrivals into this country during the past year were smaller than in 1910, exports exhibited a deficiency less than might have been expected. A feature of the exports this year has been the unusually large exports from this country to the United States. There has been a wonderfully strong feeling in Santos this autumn, prices there having risen above those ruling on this side. The present position has greatly changed, prices not having been so high as now for fifteen years. The depression which took place a few years ago was caused by bumper crops, bears selling and hedging against stocks. Now the scene has vastly changed, stocks both visible and unseen have greatly receded, and with a succession of smaller crops, this declension in supply will receive further emphasis. Large receipts in Santos caused stocks there to accumulate later in the year, but the position has been only slightly influenced downwards. The Santos market for some time has been manipulated by powerful speculative interests, who, assisted by reduced crops, apparently command the position and are able to dictate their own terms. For a long period the trade resisted the high prices, but by the autumn the strength of the position was too manifest, and as the necessity of replenishing depleted stocks became paramount, buyers were finally compelled to pay the extreme rates asked. Invisible stocks had been allowed to reach a low ebb, so that when the demand revived, the paying of stiff rates was unavoidable. As the result of the continuance of abnormally high prices consumption has fallen off, this being shown by the smaller deliveries both in Europe and the United States. . . . Trade has been consistently disappointing, and praiseworthy as are the efforts to increase the consumption of coffee in this country, the chances of satisfactory results are small so long as business is handicapped by the present excessively high prices. Prospects of the next Brazil crop have been watched with unusual interest, but the outlook has been far from promising, the flowering having been very irregular, and a small crop is generally expected. The terminal market has been in a state of much unrest more recently prices showing much divergence, owing to hard struggling between bears and bulls, principally the New York and Hamburg. Small quantities of the new crop mild descriptions have lately arrived, and have found buyers at very stiff rates, although the later tendency has been weaker, with the demand restricted, as is usual in the last few weeks of the year. After a clear rise of about 25*s*. per cwt., the market is a few shillings below best points which should form a sounder basis of the Brazil crop is really damaged to the extent one is led to believe. Some of the Central American countries expect the new crop to turn out fairly satisfactory as regards quantity.—*The Grocer.*

The Market.

The Hamburg correspondent of the *Economist*, writing on January 10, reported:—

The market has this week had to contend with a succession of depressing influences. The unexpectedly unfavourable December statistics mentioned last week continued, liberal receipts at Santos exceeding those of last year by quite one-third; weak market advices from both Santos and Rio, a steady shrinkage of values at New York, and finally the persistent absence of even a moderately active demand for coffee on the spot seem at last to have discouraged the market, and the result has been a series of quiet, slowly crumbling markets, followed at first by rallies, due to the distribution of supporting orders on the part of the leaders of the clique interested in defending prices from collapse. During the past three days this support has been less effective, and the retrograde movement has gained some momentum, so that to-day's closing values are 1½ to 1 pf. below those of a week ago. It is the greatest fall of any week since the beginning of December, carrying prices back to the level of the beginning of October.

• • •

At the moment sentiment is bearish. Prices have receded 6 pf. from the highest of last October, but are still 5 pf. higher than a year ago, and there are many who think that the levelling down process will continue. Santos is not strong, and the free marketing by the Interior of Sao Paulo seems to justify the views of those who contend that the crop will reach 10 million bags or more. Cables have been sent during the week with intent to stiffen the market, to the effect that the current month's receipts at Santos would be about 250,000 bags, that there were in the Interior about 1¼ million bags, that the next crop would not exceed 7½ million bags, and the weather was very unfavourable, and that the quality of the next crop would be low. But they found little serious attention. On the other hand attention was drawn by the result of an auction at Amsterdam yesterday, when out of 30,000 bags Santos, only 16,000 found buyers, on the basis of 66*s.* 3*d.* c. and f., for "superior," while direct c. and f. offers from Santos are still at this same figure for "good average." The spot market is likely to be very slow until the Valorization Committee, at its meeting on the 25th instant, announces what quantities will be sold this year. It is stated that the leaders have made up their minds that only 700,000 bags are to be disposed of, but circumstances between now and then *may* cause an alteration in this figure. The prospects are for a continuance of slow and easy markets, barring a renewal of aggressive manipulation through the usual well known channels.

London advices of about the same date state:—

The fall since the beginning of the month has been 4*s.* per cwt., but this only brings the price down to what it was in the early days of last autumn, when a much larger Brazilian crop was expected than will apparently now be marketed. The fall has come at a time when it most affects the mild descriptions, which are now beginning to come forward freely, and the auctions have felt it to the full extent, some parcels of Costa Rica and Central American having sold at 2*s.* to 3*s.* per cwt. decline. These latter are still much the cheapest kinds offering, and are now sufficiently attractive to lead to more business.

The Planters' Chronicle.

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Planting in Coorg.

In the Report on the Administration of Coorg, 1910-11, it is stated that the weather was moderately favourable for wet and dry crops but the unequal distribution of rain in the latter part of the cultivation season affected the outturn. The coffee crop was below the average as a natural result of a heavy crop in the previous year. The cardamom crop was affected by scanty rains in February and March and consequently the outturn was below the average. The total rainfall in 1910 was 127 inches, against an average of 125 inches for the past 15 years. The area recorded as actually cultivated with coffee was 43,636 acres, or an advance of 215 acres over that of the previous year. The total extent held under the coffee tenure was 98,958 acres, which includes (*a*) 9,356 acres of *ryotwari* cardamom *males*, (*b*) 1,546 acres of orange gardens, (*c*) 41,142 acres of abandoned coffee or land granted for coffee but not planted and (*d*) 3,278 acres planted with rubber. There is thus a net area of 43,636 acres under actual coffee cultivation, of which 38,752 acres are cultivated according to the European method and 4,884 acres in the native style. In addition to the area shown under (*d*) *supra*, 1,319 acres are cultivated with rubber and 135 acres with *agave*.

The area which is roughly estimated as being cultivated with cardamoms, *viz*, 1,903 acres, is made up of (*a*) *jama males* (382 acres), (*b*) leased *males* (941 acres) and (*c*) coffee assessed *males* (580 acres); the aggregate holdings under these heads being 11,955, 45,424 and 9,356 acres, respectively, (total 66,735 acres).

The area shown under "orchards and garden produce" consists of 293 acres of arecanut and cocoanut and 4,027 acres of orange gardens. The latter figure includes the 1,546 acres already referred to. The decrease in the area of orange gardens included in the coffee area (347 acres) relates to old gardens which have practically been abandoned. The area under pepper cultivation is estimated at 222 acres.

The results obtained on the Government experimental plots from the cultivation of *ragi*, *cholum*, tapioca and ground-nut were satisfactory. Tapioca cuttings were taken by a number of ryots. Orange plants, for which there was a great demand, were raised in nurseries and distributed at a moderate price..

An increase of over Rs.21,500 in recoveries on account of timber growth on land newly taken up for cultivation is said to have been chiefly due to recoveries on account of timber on land given out for the cultivation of rubber.

Scientific Officer's Papers.

LXXXIX.—EELWORMS ATTACKING TEA SEEDLINGS.

Eelworms or Nematode worms belong to a group of animals which usually live in damp decaying organic matter and are as a rule harmless. One species is parasitic in man and causes the elephantiasis so common in tropical countries. The eelworm which attacks plants is known as *Heterodera radicola* and it forms nodules on the roots not unlike, but usually distinguishable from, the nodules formed by the nitrifying bacteria on the roots of legumes. It is so small that it is invisible to the unaided eye though it may be made out with a good hand lens. The attack of the worms on the tender tissue of the roots of young seedlings results in the formation of a swelling due to the irritation set up. The cells which convey food and moisture to the leaves are eaten into by the worms and are thus unable to perform their functions, and plants badly attacked wilt and die.

Such injuries to the roots afford a ready entrance for fungoid and bacterial diseases and it is probable that many plant diseases are aided in their attacks by the injuries caused in the first place by eelworms. Thus the root disease of pepper, which did so much harm in the Wynaad, was suspected to gain an entrance to the roots of the Vines through the wounds made by Eelworms. (See *P. C.*, Vol. V, p. 255.)

In 1905 the Tea seedlings in one nursery at least were attacked by Eelworms in the Wynaad and Dr. C.A. Barber, the Government Botanist, Madras, investigated the matter and issued a report upon it. Tea nurseries in the Anamalais have been attacked by the same pest this year, and the following extracts from Dr. Barber's report are quoted as being of great interest in this connection.

Dr. Barber says:—

" The attacks of *Heterodera radicola* are very characteristic, although " acting differently upon different plants. There is always a gall-formation " upon the under-ground parts. But, while in some cases, this thickening " of the tissues is local, in others the whole organ is swollen for some " distance. Of course there are many transitional cases, but we have as " extremes, in the first case a series of nodules very like those on legumin" ous roots, and in the second a swollen irregular elongated mass. In the " tea seedlings the latter is the case and we find, immediately below the " collar, a great thickening of the softer tissues. The upper part of the root " is much thickened as can be readily seen. The whole strength of the " plant seems to be taken up in the formation of a parenchymatous mass of " tissue in which the various stages of the parasite are to be found. The " rest of the root-system is poor and stunted. The plant ceases to grow. " A few leaves are formed which, in spite of careful watering, soon fall off " and the plant, after struggling on for some time, dies completely away."

" I have not been able to gather much information as to the previous " appearances of this pest in India, although this does not imply that the " eelworm has not been among us for a long time. Mr. Green, the Govern" ment Entomologist of Ceylon, has told me that he had a good deal of " trouble with eelworms in 1898, when they appeared in a set of tea nur" series. His recommendation was to immediately destroy the plants and to " let the ground lie fallow for a full year afterwards. This appears to have " effectually put a stop to the outbreak.

" The whole subject of eelworm diseases has received an enormous " amount of attention in Europe. This has lately been specially due to the " great destruction caused by *Heterodera Schachtii*, a form closely allied

" to our tea eelworm among the sugar beets. The necessity for the sharpest " distinction being drawn between this and our species has placed it in our " power at once by external marks to determine each form, and we have " also obtained a fairly full knowledge of the difficult life-history of these " pests. It will be well before referring to the remedies which may be " applied to give a brief description of the principal changes which take place " in the growth of the eelworm from the egg stage to the adult female. If a " piece of swollen root be cut in two, its tissue will be seen to have scattered " through it a series of small holes about the size of a pin's head. Upon " applying a needle a whitish pulp can be extracted. This when looked at " through a microscope is seen to consist of sacs containing a multitude of " minute, kidney-shaped eggs in many of which small worms may be detected " coiled up or commencing to wriggle. These masses of eggs and the membranous coating around them are all that is left of the much swollen and " altered adult female of the eelworm.

" The minute worms escape from the decaying root and for a short " time wander in the soil around the rootlets. They then enter the tissues " of the plant, piercing the cells with a minute stylet which they bear in " their gullet. The male, at any rate, undergoes a kind of moult inside the " plant. Its inner organs shrink to a mass of protoplasm in the centre, " leaving the skin as a loose protecting layer. From this develops later a " larger worm which, rupturing the old skin, is prepared to fertilise the " growing female. The latter process probably takes place outside the " plant tissues, and when the fertile female re-enters the rootlet she does so " for life. Her shape at that time is more or less worm-like but as she " absorbs the juices of the plant she swells to a pear-like body of comparatively enormous size and in the later stages the hinder part is a mass of " eggs and young, and her form is so altered that it took many years for " observers properly to make out what these so called "cysts" were. They " are much more difficult to make out in the cinchona roots.

" It will be seen from this very short description of the eelworm's " life-history that most of its life is spent within the tissues of its host. Any " such remedy as treating the plants with the ordinary insecticides would " therefore be a waste of time and money.

" Of the remedies employed the first and most important is the " complete destruction of all infected plants. One look at the hundreds of " young produced from one swollen female will make a planter very careful not to leave a piece of diseased root about.

" After the thorough eradication of all its host plants, attention must be " paid to such eggs and young as have already escaped from the plants into " the soil. The usual remedy for these is the application of alkaline " manures. Among those recommended may be mentioned potassium and " ammonium sulphate, ferrous sulphate, sodium nitrate, kainit, etc., but " there appears to be a good deal of doubt still existing as to their efficacy. " It has for instance, from time to time been stated that the presence of " eelworm has been due to the lack of potash salts in the soil. But a series " of many years experiment has at length shown that this is not the case. " Soils containing excess of potash were found to be badly attacked, the " addition of potash by itself produced no effect, while the simple removal " of the eelworms was at once effective. It is worth while noting in this " connection that the eelworms at Dodabetta are most abundant in plots " carefully manured with nitrate of soda, nitrate of potash and superphosphate. The land has always been well cultivated and the plants are " among the best in the estate.

" As in most cases of animal pests the eelworm has its own enemies,
" and, in consideration of the alluring character of such remedies, I may
" mention that I have found many of the worms in different stages attacked
" by parasitic fungi. In one case the male worm was seen to be infested
" with hyphae from which conidia were being produced. When we are
" sufficiently advanced always to have a cryptogamist at hand in our agri-
" cultural departments, doubtless this and other similar diseases may be
" effectually lodged in the bodies of plant parasites.

" But after carefully considering the matter I think it will be evident to
" most people that the best plan to be adopted is to avoid using the land for
" some time, at any rate with a crop which is known to be subject to the
" disease."

In the course of his report Dr. Barber points out that many of the common weeds are habitually attacked by eelworms and that Cinchona is also extensively affected. In the case of the present attack in the Anamalais the pest was probably in the ground before the tea seed was put out. The only thing to do appears to be to pull out and burn all the plants now showing signs of the disease, and in future to take precautions that the nurseries are free from the disease before they are planted. To ensure this all weeds, roots, &c. should be collected and burned, the beds should be deeply dug and the soil turned over, and exposed to the heat of the sun in the dry weather, since the eelworm is dependent upon moisture. Dr. Barber in dealing with this point in the case of annual crops says, "all that is needed is that the ground should be worked constantly throughout the dry months of the year." After this s liberal dressing of lime should be worked into the beds, which should then be kept well drained.

Some experiments made in Queensland to determine the effect of fertilisers on nematode worms were recorded in the *Queensland Agricultural Journal Vol. XXVII No. 1.* The soil experimented upon was found to be full of nematodes which "increased rapidly with the cultivation and working of the soil, culminating by the third season in an amount sufficient to render the cultivation of any crop subject to their attack hopeless". Plots of this soil were treated with various fertilisers and cowpeas, which are readily susceptible to nematodes, were grown in them. The result proved that Vaporite at the rate of 1¼ lbs. per 100 square feet with 1 lb. of meat works manure gave the best result, but this was expensive. The best result, when economy was taken into account, was obtained by giving the soil a dressing of lime at the rate of 1 lb. per 100 square feet followed by ¾ lbs. of meat works manure, and ¼ lb. of sulphate of potash. This would indicate that in the case of Tea nurseries in rich soil Vaporite or Lime alone would probably be the best substances to apply.

In Mexico when coffee trees are attacked by eelworms, gasoline, benzine, sulphate of iron. carbon bisulphide and calcium carbide are said to have been used with good effect. It would be interesting to try the effect of a light dressing of nitrolim and also the effect of insecticides like vaporite and Clift's Insecticide.

In note No. 126 (*P. C.*, Vol. VI, p. 496) attention was called to the fact that a top dressing of Rape poonac had been recommended as a remedy for eelworms.

In conclusion it may be said that this disease appears to damage tea seedlings only and once the plant has developed a big root system it appears to get away from the eelworms.

RUDOLPH D. ANSTEAD, *Planting Expert.*

Notes and Comments by the Scientific Officer.

150. *Electricity and Crops.*—An account was recently given of the application of electricity to horticultural practices (Sc. O. Paper No. 87). In a recent issue of the *Gardeners' Chronicle* the results of experiments conducted at the Imperial Biological Station at Dahlem (Germany) are described. These were of two kinds. "In one the atmospheric electricity was intensified by currents passing along overhead wires, and in the other high tension electricity was applied." The results were generally in favour of the former mode of electrification. The increased growths under these conditions ranged from 15 to 40 per cent. The high tension electricity caused, when a strong current was employed, a yield of 90 to 105 per cent. as compared with the normal control; in other words a slight average decrease. The weak high tension current, however, affected the yield more favourably and produced, in some cases, as much as 25 per cent. increase. The Dahlem report concludes with a very definite caution. It points out that the whole question of the utilisation of electricity for augmenting the growth and speeding up the development of plants is in an experimental stage and suggests that growers should be cautious in adopting schemes of electrification for these purposes since the stage in which electricity can be used on a commercial scale with assured results has not yet been reached. Nevertheless, with the results of the Dahlem experiments, and those of Sir Oliver Lodge, Professor Priestley, and others, it can scarcely be doubted that the near future may see a wide-spread adoption of this new agent for the forcing of plants."

151. *Coffea robusta.*—During my recent tour in the Anamalais I saw some Coffee of this variety which had been planted out and had made very good growth. The plants appear to be somewhat variable in type and many of them looked very much like Liberian Coffee. Though only about two years old they were already showing signs of blossom. It is of interest to note that planters in other countries are having a similar experience with this variety. The Director of Agriculture in the Philippines writes of it in his Annual Report, "one hundred and forty-four plants of choice 'robusta' from Java set out in 1909 have made a very vigorous growth and are now 130 to 180 centimetres in height with bushy tops. When one and one-half years old the trees bloomed abundantly. There is a good crop of berries about one-third grown at the present time. In appearance this variety resembles the Liberian."

152. *Green Manuring.*—A copy of the first Bulletin of the General Series of the Mysore State Department of Agriculture has been received. In this Bulletin Dr. L. C. Coleman describes the System of Manuring practised in Mysore. A simple and very clear account is given of the way in which Leguminous plants obtain Nitrogen from the air by means of the nodules on their roots which are full of bacteria. and some excellent plates, reproduced from micro-photographs, illustrate the Bulletin and show these bacteria in the cells of the nodule. It is pointed out that leguminous plants contain more nitrogen in their leaves than other plants because they not only obtain it from the soil by means of their roots in the ordinary way but also accumulate it by the aid of bacteria. Hence Legumes afford the best plants for Green Manuring purposes. The best time to cut such green manures is when they are in flower before the stores of nitrogen pass from the leaves into the seed.

RUDOLPH D. ANSTEAD,
Planting Expert.

RUBBER.

United States Statistics of Malayan Rubber Growing.

Recognizing the importance to the American rubber and kindred industries of full and detailed information as to the development of rubber culture in the Malay States, a systematic investigation of the whole question has lately been made by the United States Government. This difficult task has been ably carried out by Mr. D. Milton Figart, United States Vice-Consul General in charge at Singapore, who has compiled a report covering the four years 1907-1910, which (though not yet published) *The India Rubber World* has, by the courtesy of the Bureau of Manufactures, Department of Commerce and Labour, had an opportunity of examining, and of which the leading features are reproduced below.

The report includes (1) rubber acreage, yield and production: (2) cost of development per acre and of production per pound. Other points touched upon are (3) comparative quality of product, probable output, market value and dividends; while (4) labour, diseases and other important points likewise receive attention. Appealing, as it does, alike to the rubber manufacturer and to the economic student, this skilfully compiled report amply repays perusal.

Dealing with the history of the "rubber boom," which occurred within the last year covered by the report, Mr. Figart refers to the inherent soundness of the rubber trade, as being demonstrated by the relatively small number of failures, which marked the subsequent decline in values.

MALAYAN ACREAGE AND PRODUCT.

Taking the first and last of the four years dealt with, the total rubber acreage of Malaya rose from 179,227 acres in 1907 to 362,853 in 1910, thus having more than doubled within the period in question. That the grand total of production increased from 2,278,870 pounds in 1907 to 14,368,863 pounds in 1910, would show the largely augmented productiveness of Malaya as the result of methodical and scientific rubber cultivation.

The acreage planted on December 31, 1910 (362,853 acres) represented 632 estates (as compared with 534 a year earlier) with an acreage of 292,033. Of the 1910 acreage about one-fifth had been planted during that year, while the plantings of 1909 only represented 15 per cent. of the total cultivated acreage at the end of that period.

Ceylon, while producing in 1910 more than six times as much rubber as in 1907, had a much smaller quantity to start with. Consequently the excess in the Malayan yield, as compared with that of Ceylon now amounts to about 11,000,000 pounds, as illustrated by the following comparison:

		1907.	1910.
Malaya	lbs.	2,278,870	14,368,863
Ceylon	„	556,080	3,298,652

COMPARATIVE ACREAGE IN THE FAR EAST.

Much interest attaches to the following details of the present rubber acreage in various Asiatic countries:—

RUBBER ACREAGE, 1910.

Malaya	362,853
Ceylon	241,885
Netherlands Indies	150,000
Burma	13,525
Cochin China...	11,000
South India	30,000
Total acres, 1910...	809,263

From a comparison of this table with the figures already quoted, it would seem that Malaya, with 362,853 acres, produced in 1910 14,368,863 pounds, while Ceylon, with 241,885 acres, only produced 3,298,652 pounds.

COST OF DEVELOPMENT PER ACRE.

Following the above important statistical facts, is a valuable estimate prepared by Mr. C. M. Cumming, Manager of Linggi Plantation, Limited, Selangor, of the cost of opening up a rubber plantation of 1,000 acres (250 acres each year) including 10 per cent. for contingencies. The cost is estimated as representing: First year, $19,681; second year, $18,588; third year, $22,649; fourth year, $33,902; fifth year, $26,741; sixth year, $27,053; seventh year, $31,240. The total cost (without interest) would thus far be $179,854, but striking off respectively one-eighth, one-third and five-eighths for the last three years, the amount would be reduced to $147,969, or approximately (as Mr. Figart states) 150 per acre.

Taking the principal items of gross expenses for the first and seventh years, the following resusts will be shown :—

	1st year.	7th year.
Premium and survey...	$2,272	...
Clearing 250 acres	2,130	...
Planting 250 acres	852	...
Plants and seeds	1,136	...
Bungalow	1,704	...
Hospital, etc.	1,704	...
Rent	568	2,272
Superintendence	2,272	4,260
Weeding	1,278	8,520
Machinery	...	5,680
Other expenses	3,976	7,668
	17,892	28,400
Contingencies, 10 per cent.	1,789	2,840
	$19,681	$31,240

The estimate of $150 an acre, it will be remembered, is arrived at in conjunction with five-eighths of the amount of the expenses for the seventh year, being charges to revenue.

YIELD PER ACRE.

According to the estimate of prominent planters, the annual yields per acre may be counted as follows :—

	Pounds.
Fifth year	50
Sixth year	150/188
Seventh year	250/281
Eighth year	350/381
Ninth year	400/494
Tenth year	400/577
Eleventh year	400/633

While well managed estates have been producing from 500 to 800 pounds of rubber per acre, it is remarked that in many cases these figures will not be reached. At the same time, it is added, these conservative estimates will probably be greatly exceeded, if tapping is delayed until the proper period has elapsed, and is then carried on in the most scientific manner.

ESTIMATED RESULTS AT FIFTH AND TWELFTH YEARS.

In *pro-formâ* calculations given of prospective annual results from the fifth to the twelfth year, the lowest of the above estimates of quantity is used as a basis of calculation.

The scope and general features of the above-named calculations are illustrated by the following estimates, applicable to an estate of 1,000 acres :—

Fifth year—250 acres at 50 lbs. per annum—12,500 lbs. at $0·72 per lb.	$9,000
Less cost of production at $0·48 per lb.	$6,000
(Estimated result)	$3,000
Twelfth year—1,000 acres at 400 lbs. per annum—400,000 lbs. at $0·72 per lb	$288,000
Less cost of production at $0·36 per lb.	144,000
(Estimated result)	$144,000

COST OF PRODUCTION PER POUND.

As to this crucial point, it is stated that the average cost per pound, for 33 estates taken indiscriminately, equalled 1s. 2⅓d. or $0·26. This average, it is noted, is on a basis including young trees. That in the estimates of the results just referred to, the cost of production is figured at 36 cents, is in harmony with the conservative nature of Mr. Figart's other calculations.

PROBABLE OUTPUT.

Mr. Figart's view that nothing definite can be said about the probable output of rubber, is a statement of importance. At the same time, he quotes the subjoined estimates of two prominent rubber men, which are very close to each other, which he characterizes as being "as good estimates as can be obtained:"

Production, 1910.

Malaya alone	14,368,863 lbs.	(or about) 6,450 tons.
Ceylon alone	3,298,652 ,,	,, 1,450 ,,
Total Far East...	17,667,515 ,,	,, 7,900 ,,

Estimate No. 1 (Malaya alone).

	Tons.
1910	6,450
1911	11,000
1912	18,000
1913	24,000
1914	33,000
1915	45,000
1916	66,000

Estimate No. 2 (for total Far East).

1910	7,900
1911	16,000—17,000
1912	25,000—30,000
1913	40,000—45,000
1914	55,000—60,000
1915	70,000

When figures in respect to Ceylon the Netherlands, Indies, Burma, etc., added to those from Malaya in estimate No. 1, the result will be very close to that shown by the second estimate.

COMPARATIVE QUALITY OF PRODUCT.

On this subject Mr. Figart makes the following recommendation:—

"Plantation rubber, while superior to fine hard Pará in resinous and mineral tests, has generally proved inferior in strength, and more care must be taken in working it up, to prevent a soft product resulting. Recent tests, however, have been more satisfactory: and with improved methods in cultivating, collecting, coagulating, and preparing (plantation) rubber, it is confidently expected that the future product will approximate fine hard Pará in every important test."

MARKET VALUE AND DIVIDENDS.

In connection with these points Mr. Figart remarks that the following conditions may be assumed:—

Cost of Production, 36 cents per pound; (some estates now turning out rubber for less than 24 cents.)

Selling Price, 2 shillings of 48 cents.

Profit, 12 cents. per pound.

On the basis of the two estimates previously referred to of 400 and 577 pounds per acre for ten-year-old trees, it is calculated that the profit per acre would be respectively $48 and $69. Taking even the lower figure, it is shown that in the cases of seven estates chosen indiscriminately, the profit would represent, for original investors from 17·4 per cent. to 61·5 per cent.; while on the present high market values, the shares would pay from 2·6 per cent. to 6 per cent. These results, it is urged, show the sound basis of the industry, even with appreciated share value.

LABOUR.

A constant increase is recorded in the arrivals of Chinese immigrants at both Singapore and Penang; the number landed at the former port in 1910 having been 216,321, as against 151,752 for 1909. The number arriving at Penang was 59,414, being 37 per cent. in excess of that recorded for the previous year. It being calculated that by 1920 there may perhaps be a million acres of rubber trees in Malaya, as compared with about one-third that area at present under cultivation, this possible three-fold increase would necessitate a labour force of 600,000 to 700,000 coolies, against the 200,000 at which the present number has been estimated. The prospective increased cost of the cooly labour required to meet the needs of the estates is a factor to which Mr. Figart calls attention, as possibly enhancing the cost of Malayan rubber production.

CROPS.

A distinction as to accessory crops is drawn between catch-crops and cover crops. The former description is grown for the purpose of getting revenue, during the first four or five years, up to the time when the rubber is at the producing stage, but agriculturally they are not to be recommended. In the Federated Malay States, less than 6 per cent. of the rubber acreage was planted in 1910 with catch crops (principally coffee), as against 10 per cent., in 1909, while in the Straits Settlements the percentage was only 28 per cent. as compared with 40 per cent. for the previous year.

Cover-crops are planted between rubber, at present chiefly with the object of reducing the expenditure on weeding. Mr. Figart remarks that no cover-crop can be unconditionally recommended in Malayan plantations; considering the best procedure at present to be absolute clean weeding. He adds that if a leguminous and easily controlled cover crop were introduced, it might be preferable even to clean weeding, particularly if it paid the cost of its own production.

RUBBER SEED OIL AND POONAC.

Although experiments in crushing rubber seeds for the oil and residual poonac have so far been without satisfactory results, recommendations have been sent to planters to instal machinery suitable for the purposes named, so as to continue trials in the direction indicated.

DETAILS OF PLANTATION EXPENDITURE.

In a detailed appendix, the work of Mr. C. C. Malet, formerly connected with the Agriculture Department of the Belgian Congo, and at present a licensed valuator in the Straits Settlements, full *pro-forma* particulars are shown of the various elements of costs of rubber production on a thousand acre estate, on the basis of 400 pounds per acre, and an average per acre of about 120 trees. The cost of production is quoted as a fraction under 26 cents per pound for the estimated annual product of 400,000 pounds.

THE FUTURE OF RUBBER.

Mr. Figart's views on the general situation of rubber are so broad and far seeing that they may with advantage be quoted literally:—

"Considerable thought is being given to the question of whether the future plantation rubber industry will be much affected by the wild rubber supply. The present cost of marketing wild rubber is higher than the cost of producing plantation rubber, and with the large quantities of the latter coming on the market in a few years' time (possibly 100,000 to 150,000 tons), there will be a strong tendency in the direction of reducing the supply of wild rubber which can be marketed at a profit. Realizing this, the Brazilian Government is taking steps which will make possible a material reduction in the cost of collecting wild rubber. However, it is the general opinion of manufacturers that the new uses to which rubber will be devoted will absorb the visible supply, and maintain prices at a figure which will allow a liberal margin of profit to investors in plantation rubber. This fact is evidenced by the investment in the Orient of millions of dollars in this industry by a group of American Capitalists, but a small percentage of whose holdings is planted and none of which are in bearing."

One planter has the following to say:—

"'When the output from the plantations (say 1,000,000 to 1,200,000 acres in more or less full bearing by 1920-22) amounts to over 200,000 tons per year, then, in order to sell this huge output, the price must be reduced so low that many new channels of consumption will be opened up, which means a probable average price of, say, 30 cents per pound at which price it is not at present conceivable that fine hard Pará can be profitably collected even under the best circumstances.'"

"The above is of course based on a much lower cost of production than the writer has used in this article."

While it has only been possible to reproduce some of the most prominent features, the above summary indicates the leading points of the report, and shows the vast amount of preparation and skilful compilation undertaken by Mr. Figart and his colleagues.—*The India Rubber World.*

COFFEE IN VENEZUELA.

H. M. Legation at Caracas reported, under date of 24th. October, 1911, that the abundant crop of coffee in Venezuela then being harvested, and the high price of that staple, promised a prosperous year for the country, and exchange had risen to par in consequence.

COMPANIES.

Nilambur Rubber Estates.

The Secretary of the Nilambur Rubber Estates, Ltd., has issued to the shareholders a report upon the Company's estates by Mr. John Aird, the Manager in India, which states as follows:—During the past year very considerable progress was made towards getting the Glenrock estate into a satisfactory condition of cultivation. The rank growth of "dubbay" grass and secondary jungle which existed at this time last year over practically the entire area was cut down and several fields put into a thorough state of cultivation. After the growth mentioned above had been cut down systematic cultivation by digging was instituted, and round after round of this work was done until the dubbay was practically eradicated and the soil in excellent condition as regards tilth. I think I can safely say that the rubber, both old and supplies, has responded in a satisfactory manner, as during the season the growth and healthy colour of the foliage was in marked contrast to those on which the work had not been taken in hand. This was especially so on No. 1 field, which was first started, and had the benefit of good north-east monsoon rains after the work had been taken in hand. On the fields dug during the previous dry weather all weeds of an objectionable character were pulled up by hand and the soft "goat weed" kept close to the ground by grass knifing. This goat weed, which now greatly predominates over the dug land, is entirely unobjectionable, and scientists say beneficial. Digging has again been taken in hand, and good progress made since the cessation of the south-west monsoon. 34,084 plants were put down during the past monsoon, and naturally this represents a large proportion of the planted area of the estate. The plants are so far doing well and I trust that our requirements in this way will next year show a great reduction. The shade trees which existed in No. 3 field have been cut out, and rubber is now improving. Pink disease had obtained a firm hold, and many trees were suffering from it at this time last year. These were stumped where stems were attacked, and pruned where branches only were affected, and the diseased wood burnt, and I am glad to say that practically no disease is now in evidence. Stump rot also existed, and a good many trees were attacked, but these have been isolated by trenches to prevent the spread of the fungus to surrounding trees and this has proved effective. Three small fields of tea exist on the property, but as no work had apparently been done on these since planting—which must have been done a considerable number of years ago—the jungle had grown over them and they had suffered much from fire. This jungle growth has now been removed and the fields cleaned up and put in order. The loppings will soon rot and the crop of tea seed in the coming year should be of considerable value. Some seed was obtained this year, and a few maunds sold. A new field of 30 acres was also cleared and planted during the past monsoon, but owing to the early cessation of the rains, vacancies are numerous in this. Arrangements have also been made to do a clearing this coming season and felling is now being started and nurseries made, and I hope these timely plans will ensure success. I am glad to be able to report that there is a vast improvement in the matter of labour, and I have every hope that we are now at the end of our difficulties, as coolies are coming in freely from the Coast and I have now got some 450 of these and a gang of permanent coolies numbering 253. Canarese maistries of a desirable class are now making preliminary enquiries for the coming season, and I hope to secure an adequate supply of this class of labour in future.

The cultivation on the Nirpuzha estate was principally confined to grass knifing. During the past south-west monsoon cultivation has been confined to grass knifing, but since the cessation of the rains forking round the plants has again been taken in hand, and the whole area will be done in this way in the course of the next two months, I hope. The whole estate was supplied and some 14,000 plants were put out. These are doing well, and I hope there will be very little required in this way during the coming year. So far I have seen no signs of either pink disease or stump rot on this estate. Pará seed were put down the nursery in August and September last, and plants are coming on well. I hope there may be a sufficient number in this nursery to supply all the three estates in the coming year. A block of 198 acres was planted during the past south-west monsoon. This represents the balance of area originally cleared but which it was apparently found either impossible or undesirable to plant in the monsoon of 1909. Reclearing, lining, holding, and planting was got through in good time, and plants are coming on well. The labour question is one on which I regret to say very little real progress has been made, and the labour force still remains a very unsettled and fluctuating one. At present there are about 400 coolies on the estate, and this would fully meet requirements if permanent. I hope that with settled conditions, coolies and maistries may acquire confidence on this estate also, and come in and settle down better in the coming year than they have done in the past. The Munderi estate was taken over as from April last. During the past monsoon the weeds have been kept in hand by grass knifing but since the cessation of the south-west rains forking round the plants has been started and this work will be continued until the entire area is done. Digging is also in hand and I hope to have the whole estate cleaned up shortly. No nurseries existed on the estate but plants were obtained and the whole area supplied. Pink disease was in evidence, and affected trees have been stumped and burnt. We are still practically dependent on Coast labour on this estate also, and consequently the supply is a very fluctuating one. At present there are some 200 coolies at work, and this gang, if maintained, would be sufficient for our requirements.

H. M. Consul-General at Mexico City has furnished the following estimate of the Coffee crop in Mexico in 1911, as compared with 1910:—

	Result in 1910. Tons.	Estimate for 1911. Tons.
States of Vera Cruz and Tabasco ...	22,150	26,500
States of Colima and Sinaloa and Territorry of Tepic	230	230
States of Oaxaca, Guererro and Chiapas..	2,794	11,096

It should be noted that the figures do not include the production in the State of Puebla, which in 1910 is estimated at from 650 to 680 tons.

:o:

It is stated in the report on the Government Botanical Gardens, Saharanpur, 31st March, 1911 that in the latter part of 1908 some seeds of a new rubber-producing tree were received from the Superintendent of the Royal Botanical Gardens, Calcutta, under the name of Jequie rubber (*Manihot dichotoma*). A few only germinated, and these were grown in pots under protection until August of 1910. Fifteen plants were planted out in a specially selected spot. The average height of the plants then being 2'—6" ranging from 1'—4" to 4'—3". Since then 2 plants have died, probably killed by white ants. The condition of the others is fairly healthy, but very little growth has been made. A few plants dropped their leaves, but the majority retained them. Apparently, they were unaffected by the cold. It is, however, premature as yet to say that this desirable kind of rubber will flourish in this part of India.

SELECTED CUTTINGS.

Chemical Nature of Soil Organic Matter.

Bulletin No. 74 of the United States Department of Agriculture, Bureau of Soils, is written by Messrs. Oswald Schreiner and Edmund C. Shorey and deals with the *Chemical Nature of Soil Organic Matter.* The methods of extracting a number of organic bodies from the soil, together with their chemical composition and properties are given in detail, and the Bulletin is in consequence too technical to be of interest to the general reader. The introduction, however, dealing with the general problem of the composition of Humus is of great interest and is reproduced below:—

" Every soil investigator, whether it be the chemist, bacteriologist, or " physicist studying some special problem, or the agronomist dealing with the " general relation of soils to crops, sooner or later encounters difficulties " that have their origin in the lack of knowledge of the chemical composition " of the organic matter of the soil.

' Some organic matter is essential to make a soil of what would other- " wise be pulverised and more or less hydrolysed rock, and while there are " some soils capable of growing crops that contain very small quantities of " organic matter, on the whole the quantity of this material in average soils " is considerable. Analyses have shown that the average organic content of " the soils of the United States is 2·06 per cent. and of subsoils 0·83 per " cent.

" This means 28 tons of organic matter per acre in the first 8 inches of " soil and 50 tons in the soil and subsoil together to the depth of 2 feet.

" The varied sources of this organic matter and the different classes of " compounds that are known to result from the decomposition of this material " have been fully discussed in a previous publication and it is necessary " to state here simply the fact that this organic matter may have its source " in the remains of any plant or animal, and the resulting compounds may " be those that were in the living tissues and have resisted decay, these that " result from a splitting or degradation of complex bodies present in the " living plant or animal, or compounds arising through changes brought " about by micro-organisms, and that nearly all classes of organic chemical " compounds known may be represented.

" Two views regrading the soil organic matter are at present current " in agricultural literature. The first is some modification of the view of " Mulder (1849), " that at present seven different organic substances are " known to exist in the soil. They are crenic acid, apocrenic acid, geic " acid, humic acid and humin, ulmic acid and ulmin.

" This view, modified to the extent that some such body as humic acid, " differing perhaps in different soils but having the same general properties, " makes up the humus and the greater portion of the organic matter of all " soils, is accepted by many agronomists and chemists. The acceptance of " this view, which originated in the days when there was no organic chemis- " try in the present meaning of the term, can be attributed to two factors " which have tended to retard the progress not only of agricultural chemis- " try but of other branching of Science as well. These are the tendency to " simplify or unify what proper thought would show to be complex; and " second, the too prevalent habit of some investigators and most compilers " of repeating or quoting scientific statements or deductions which have been " made in the first place on wholly insufficient grounds. This view of soil "organic matter has been fully discussed in a previous bulletin and it is not necessary to repeat that discussion here, for one of the results of the present paper is to show that the bodies that Mulder regarded as simple compounds related to each other are really made up of a large number of chemical compounds not necessarily related.

"In strong contrast to this view of the simple composition of the soil organic matter is the second view current in agricultural literature, that the material is of a very complex nature, regarding which very little is known. Little fault can be found with this statement in itself but it is often made in such a way as to convey the impression that not only do we know little regarding its complexity, but that it is almost hopeless to attempt any investigation of it. There is, moreover, seldom coupled with this confession of ignorance any appreciation of the importance of a thorough knowledge of the chemical composition of this important soil constituent.

"In considering the importance of the organic matter of the soil it should be borne in mind that it is material that is the result of change, and that much, perhaps all of it, is susceptible of still further change; that is, it is in a transition stage. The changes which it has undergone and the changes which it may still undergo are determined by a number of factors, chief of which are moisture, aeration, character of micro-organisms, and mutual relation of the organic compounds and the mineral constituents. These factors are many of them influenced or controlled by the cultural methods, including fertilising, drainage, irrigation, inoculation, &c., used in practical agriclture. While it is true that the soil, viewed from whatever point, presents dynamic problems, the study of the orgrnic matter without doubt presents such problems in greatest complexity but at the same time problems most susceptible of solution, once the character of the material is known.

"This view of the inportance of soil organic matter concerns the agronomist and farmer, but when the work of the special investigator is considered the need of definite knowledge is even more strongly emphasised. It is not necessary that the practical agriculturalist should know the chemical names or formulae of the organic compounds in the soil, but to the scientific investigator to whom the former looks for the "Why" of agricultural operations such knowledge is necessary because it carries with it a knowledge of their properties. There can be intelligent chemical treatment of any material only when the chemical nature of the material treated is known. The treatment to which soil organic matter is subjected under cultural methods is in part at least chemicle treatment in that such methods induce chemical changes. The operations of irrigation, conserving of moisture by mulches, aeration by cultivation, inoculation with cultures of bacteria, addition of organic and green manures, are all common agricultural methods used by farmers, and they are also operations that influence the chemical changes which soil organic matter undergoes. The influence of the organic matter of the soil may be considered under four heads. Its effect on the crop, its effect on the bacteria and fungi of the soil, its influence on the physical properties of the soil, and its relation chemically to the mineral ingredients of the soil.

"It is a well-established fact that some chemical compounds which occur in plants and may get into the soil are harmful to growing plants when presented in water solution to the roots. It has also been shown that some organic compounds that occur in soils and have been isolated "from them are also harmful to growing plants under these conditions.' On the other hand, plants may take up other organic compounds when presented to their roots in water solution without injury to the plant, or in the case of some nitrogenous bodies, with benefit. Now, while the organic matter of soils is for the most part little soluble in water, a water extract of soils always contains some organic matter. In consequence organic compounds have always to be considered as a portion of the material in the nutrient solution supplied to crops growing in the soil.

"The chief function of bacteria and fungi is to act on the higher organic compounds which make up living organisms and convert them into simpler compounds. In other words, these higher compounds are the food of the micro-organisms. The simpler compounds resulting from the activity of the fungi and bacteria commonly spoken of as the products of decay or fermentation are, in part at least, still organic substances and help to make up this portion of the soil. No fact regarding bacteria is better established than that they are influenced not only in habit of growth but also in the character of the compounds produced, by the chemical composition of the medium in which they are grown and are generally intolerant of the presence of an excess of their own by-products. The soil organic matter inpregnated with the soil solution is then the culture medium in which soil micro-organisms have to grow and contains also the products of their growth. Bacteria, the activity of which is beneficial to crops, may fail to flourish because the food supplied them is not suitable or because their own products or the products of other forms hinder their growth. On the other hand, the activity of harmful bacteria, fungi, or protozoa may be simulated by an abundant supply of suitable food. The necessity, then, of some chemical knowledge of this culture medium and by-products in any study of the mutual relation of soil micro-organisms to each other or to crops is apparent.

"The properties of soils generally included under the term "physical" such as water-holding power, heat-conductivity, absorption, and granulation are universally recognised as potent factors in determining the character of a soil and its adaptability to the growing of crops. In considering these factors the tendency has been to consider the soil simply as an aggregate of mineral particles of different sizes, and consequently of different surface area, and to correlate the varying physical properties with this variation. That this view is wholly inadequate is evident, for solid organic matter may also be present in particles of different sizes, and these may have different physical properties due not only to variation in size, but probably in even greater degree to differences in chemical composition and structure. Furthermore, the organic matter may, and in fact generally does, play an intimate part in the behaviour of the mineral particles entering into chemical combination, coating them or cementing them together. The organic matter becomes, therefore, of the greatest importance in its influence on the great controlling factors in crop production, such as the solubility of the soil minerals, the physical structure of the soil granules, and the water-holding power of soils. To illustrate this, there was found in California a soil which could not be properly wetted, either by rain or irrigation or movement of water from the subsoil, with the result that the land could not be used properly for agriculture. On investigation, it was found that this peculiarity of the soil was due to the organic matter; which when extracted had the properties of a varnish, repelling water to an extreme degree. The soil, once freed of this ingredient, had a high water-holding power. From other soils bodies of a waxy nature have been isolated and it can thus be seen

"that certain kinds of organic matter are important as the cause of the low
"water-holding power of some soils, although in general the presence of
"the organic remains of plants increases the power of soils to hold moisture
"an important factor in crop production. It is evident, then, that there can
"be intelligent study of the influence that the organic matter of the soil has
"on its physical properties only when the chemical identity of its several
"components is known.

"The great majority of organic chemical compounds are reactive
"towards inorganic compounds, acids, bases and salts. Organic acids can
"form salts with mineral bases or double salts with mineral salts. Organic
"bases form salts with mineral acids, and quite a number of organic com-
"pounds combine both acid and basic properties and form organic com-
"pounds with both mineral acids and bases. Such being the case, there
"necessarily exists a mutual relation between the organic compounds in
"the soil and the mineral particles which form its foundation. Some of the
"acids isolated from the soils could not exist free for any time in a soil
"containing free bases or salts of weak acids, such as carbonic acid, and
"there is abundant evidence that may of the organic compounds exist in
"the soil in mineral combination. In fact, the relation between the organic
"and mineral particles of the soil is so intimate that any differentiation of
"soil chemistry into organic and inorganic should not be used as the basis
"of any theory or line of argument regarding the soil phenomena or soil
"treatment."

Coffee.

At the resumption of sales on Thursday there was a good demand and prices were steady and occassionally dearer. The arrivals have been small, but this month a fair quantity of all the Central American growths and some of the East Indian may be expected. That dealers are short of stock is quite evident, and that alone will be sufficient to ensure a steady demand, but prices are generally considered to be too high, and there is little likelihood of any buying except for immediate requirements. Fortunately, apart from Brazil descriptions, there is a prospect of a larger supply this year as the following table, compiled by a firm in Rotterdam, shows.

CROPS AND CROP PROSPECTS TO DATE.

		Estimate 1912/13.	Estimate 1911/12.	1910/11.	1909/10.
Rio	Bags.	2,500,000	2 500,000	2,438,000	3,449,000
Santos	,,	7,500,000	9,250,000	8,110,000	11,495.000
Victoria	,,	280,000	350,000	185,000	276,000
Bahia	,,	140,000	200,000	120,000	110,000
Java, Sumatra, &c. ...	,,	700,000	357,000	277,000	245.000
British East India ...	,,	250,000	185,000	200,000	250,000
Venezuela ...	,,	875,000	650,000	742,000	860,000
Costa Rica ...	,,	200,000	207.000	233,000	190,000
Mexico	,,	550,000	547,000	320,000	400,000
Guatemala ...	,,	550,000	560,000	490.000	550,000
San Salvador ...	,,	450,000	475.000	415,000	360,000
Nicaragua ...	,,	150,000	150,000	130,000	200,000
Haiti	,,	480,000	375,000	450,000	320,000.

In the terminal market the publication of the monthly figures produced a set back in prices, the word's visible supply being 146,000 bags less during December than last year, while in the same month a year ago there was an increase of 588,000 bags. An estimate, since issued, that only 1¼ million bags of the present crop remain to come forward, and confirming the next crop estimate of 7½ million bags for Santos, has steadied the market again, but there is still a large amount of scepticism as to the reliablity of such figures.—*Produce Markets' Review*, January 6, 1912.

The Planters' Chronicle.

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San Paulo Government Coffee.

A Meeting of the Committee charged with the management of the San Paulo Government Coffee was held on January 25, 1912. The following statement was approved:—

"1. With reference to the Circular, dated January, 5, 1909, issued by the Committee, it has been decided that all future sales of Government Coffee shall be made either by private negotiation in New York or by tender in Europe until further notice.

"2. In accordance with this decision 400,000 bags have been sold to-day in New York at a price of 15 cents for New York Coffee Exchange Standard, No. 4.

"3. 300.000 bags will be sold in Europe by tender, as follows:—

About	120,000	bags	in	Havre and Marseilles.
„	100,000	„	„	Hamburg and Bremen.
„	30,000	„	„	Rotterdam.
„	40,000	„	„	Antwerp.
„	10,000	„	„	Trieste.

"(*a*) Samples of this coffee will be exhibited in each market between February 5 and 9.

"(*b*) Tenders will be invited for lots of 10,000 bags.

"(*c*) Tenders will be received by Messrs. J. Henry Schröder & Co., on February 12th.

"4. The Committee have to-day received on offer of 83 francs for good average Havre type, in force until February 12, 1912, for the whole of the above 300,000 bags to be sold in Europe, which offer the Committee is at liberty to accept in part or as a whole.

"5. No further sales of Government Coffee will be made in the year 1912.

"6. 300,000 bags of Government Santos Coffee, at present warehoused in Europe, will be shipped to New York and taken from the warehouses in the following markets:—

Antwerp	...	...	200,000 bags
Havre	...	...	100,000 „

the stocks of Government Santos Coffee in New York having all been sold."

Messrs. G. Dunring and Zoon, of Rotterdam, report that the above statement "made a very good impression, especially so as the sales are to be made without delay."

Scientific Officer's Papers.

XC.—EELWORMS, II.

Since my last Paper on this subject I have received Bulletin No. 217 of the Bureau of Plant Industry of the U. S. Department of Agriculture, which deals with the question of Eelworms in a very exhaustive manner.

That the disease is a very common one may be judged from the fact that it has been reported upon 480 different kinds of plants and it appears to be found practically all over the world.

The author of the Bulletin, Mr. E. A. Bessey, describes the different stages of the Eelworm with great minuteness. The history of the disease in the plant is briefly as follows:—

"The larvae of the root-knot nematode are able to remain alive in the soil for months without entering upon a parasitic existence. The writer has been unable, however, to find any evidence that they take any nourishment from the soil; at least they undergo no development until they enter the roots of some plant, for if the soil be kept free from vegetation for two years they all die. Even one year without food is sufficient to kill large numbers of them.

"In the normal course of development the larvae, having encountered a root, seek its growing point and batter their way into it by the aid of the buccal spear. They then take up a position entirely within the root and parallel to its longitudinal axis, the anterior end pointing away from the root tip. This position may be in the plerome, or perhaps as frequently, if not more often, in the periblem. In the former case the nematode lies within the central cylinder as the root develops, in the latter case in the cortex. In either case the anterior end of the nematode is usually in close connection with the cells surrounding the conductive tissues. In the case of larvae which hatch from eggs produced within the root, some bore their way out into the surrounding soil and enter new roots, as described above, while others burrow along in tissues of the root and settle down, usually in the fleshy cortex. Thus an old nematode gall will contain nematodes in all stages of development and at a depth below the surface of the root of even 5 or more centimeters. The latter has been observed by the writer in roots of sweet potato (*Ipomoea batatas*) at Miami, Fla.

"Within the tissues the larva becomes fixed in position and remains quiet except for occasional movements of the spear and esophageal bulb. Whether all the nourishment is taken through the hollow spear or some is absorbed directly through the skin was not determined. It seems probable however, that the former is the case, especially in view of the fact that the female occasionally bursts the surrounding tissues of the root, so that she lies outside the latter except for the anterior portion, which remains buried in the tissues."

With regard to the methods by which the disease may be spread the Bulletin says:—

"The larva of *Heterodera radicicola* is capable of active movement in the soil, and in this manner doubtless the disease is slowly spread. From some experiments made by Frank, he estimated the rate of progress at about 3 cm. per week. This would amount, during the warm weather, in which infection occurs, say May 1 to September 15, to about 75 cm., or about 30 inches. These figures are probably far too low. However, it is not through their own efforts that these nematodes are mainly spread. There are many means of transportation at their disposal. A very frequent one is running water. Thus, a field previously free from the pest sometimes shows its presence in those spots where surface water at a time of heavy rains has deposited a lot of soil from an infested field lying higher up. In this way the pest has been carried from infested fields even to uncultivated woods, as observed by the writer at one place. It has been suggested that heavy winds carrying large quantities of soil from one field to another may also transfer the nematodes, but in view of their susceptibility to injury by drying, this seems little likely. Especially is this unlikely since the larvae shun dry soil, and so would not be present in that part of the soil which is dry enough to be transported by the wind. More effective as means of transportation are the hoofs of animals, wheels of vehicles, farm implements, and men's boots. It is difficult to see how it would be possible to avoid conveying living nematode larvae from one field to another on farm implements if they are left, as is too often the case, uncleaned on being transferred from one field to the next. Thus, a wagon and horses going from one field to another would, if the soil were at all damp, carry some of the damp earth, probably containing nematode larvae, with them.

The foregoing explains the spread of nematodes after they have once been introduced into a locality. The introduction of nematodes into a new locality, however, must have some other manner of accomplishment. This seems to be in most cases along with nursery stock. Thus, the writer found that in parts of Texas the nematode appeared first in the soil near fig and mulberry trees obtained from farther east, which were noticed at the time of planting, several years ago, to have knotted roots. In this way the soil near the trees became infested and thence the disease spread, as previously described, to different points in the locality. Perhaps east of the irrigated districts the fig, mulberry, and peach are responsible more than any other plants for the spread of the disease. Since the putting into effect of good nursery inspection much of this source of infection has been cut off. In the irrigated districts of Arizona and California the vine was observed in several cases to be the plant at fault. The strawberry has been observed at a few points in the East as the plant upon which the pest was introduced. It is often badly affected without showing much injury. A case has been called to the writer's attention in which the disease was introduced into a garden in Washington, D.C., by asparagus roots from an infested field. The wide distribution of the disease in ginseng plantations is doubtless due to the setting out of small rooted plants from infested regions, as well as to the practice of some growers of packing the seed in damp earth. Should this come, as is natural, from the vicinity of the ginseng bed and this be affected by the nematodes, the danger of sending nematodes along with the seeds is very great. The dirt used for packing is naturally thrown out at the point where the seeds are planted, and thus the larvae, if present, are able to enter the soil and infect the young ginseng seedlings. Seed potatoes are also another known source of introduction of the disease."

The danger of moving soil from one district to another cannot be overestimated, and it is to be hoped that this practice will before long be made a punishable offence.

The parasite works near the surface of the ground, as a rule within the first foot of soil, though the author states that he has found scattered galls at more than a yard below the surface. If plants can be forced to root extensively at a depth of 16 inches or more they are out of the zone of danger and suffer little from the pest.

The conditions which favour Eelworms are stated to be, firstly, a light soil; " wherever the soil is sandy or contains a fairly large proportion of sand, other conditions being favourable, the root-knot nematode may be expected to thrive when once it is introduced. In heavy soils on the other-hand the disease seems never to be serious."

Secondly, a certain degree of moisture is necessary for the maintenance of the life of the nematode in the soil.

Thirdly, temperature is a controlling factor, the higher the temperature, the better the nematodes like it. "The root-knot nematode does not become active in the soil and begin to penetrate the roots of susceptible plants until the soil begins to be warm. In the tropical and subtropical regions plants are subject to attack all the year round, but the farther north one passes the longer is the winter period of comparative immunity from injury by this pest."

With regard to control the Bulletin is not very optimistic. It is advised that seed beds and nurseries should be sterilised before planting either by steam or formaldehyde. This matter of sterilising seed beds was mentioned in a former Paper of mine, (*P. C.*, Vol. VI. p. 461). The steaming method is I fear not practical in this country, but the formaldehyde method is a possibility. The author says about it:

"The formaldehyde method consists essentially of treating the soil with a weak solution of commercial formaldehyde (or formalin). It has been found that a solution of 1 part commercial (36 to 46 per cent.) formaldehyde in 100 parts water is effective against the root-knot nematode in shallow beds when applied at the rate of 1 to ½ gallons (or more in the case of very absorbent soils) to every square yard of soil surface. For deep beds the quantity must be increased. Care must be taken that all parts of the soil are reached and thoroughly wetted by the solution. Upon the thoroughness with which it is done depends largely the success of the process. After the formaldehyde solution has soaked in the soil should be thoroughly stirred, so that all parts may be exposed to the disinfectant. Before setting into the soil any plants or sowing any seeds the excess of formaldehyde must be allowed to escape by evaporation or, if necessary, be washed out by flooding the bed. The former is preferable. The writer has not found the germination of seeds interfered with when 10 days are allowed to elapse between the treatment and the sowing of the seeds, especially if the soil be allowed to become rather dry and be stirred in the meanwhile.

"This formaldehyde treatment has been used with success at the Ohio Agricultural Experiment Station in the forcing house and seed beds. It was applied primarily to prevent certain damping-off fungi from destroying the seedlings, but it was found that the nematodes were sometimes destroyed also or greatly reduced in numbers."

The treatment of plants already attacked is almost impossible. Means that will destroy the nematodes are mostly injurious to the plants containing them. "Under certain conditions the use of the formaldehyde solution has been found efficacious with some kinds of Roses. Many plants are killed outright by the treatment, but Roses, at least some sorts, are less susceptible to injury. Doubtless other plants might be treated similarly, but the method should be tried with caution, even for Roses, until it is ascertained that the plants will not be killed."

It would be worth while determining by direct experiment whether Tea is one of those plants which is resistant to formaldehyde poisoning.

Many other insecticides have been tried and also fertilisers but with indifferent success. If the soil can be thoroughly dried out nematodes are killed to a large extent, and it should be possible to get rid of them in the hot weather by constantly digging up and pulverising the soil.

Fertilisers alone do not appear to have much effect, though the author says at the conclusion of his section on methods of control, "should none of the foregoing methods be feasible, high fertilisation especially with that element which is most nearly deficient in the soil, will prove helpful, although it will not kill the nematodes."

RUDOLPH D. ANSTEAD,
Planting Expert.

DISTRICT PLANTERS' ASSOCIATIONS.

Central Travancore Planters' Association.

Proceedings of the Annual General Meeting of the Central Travancore Planters' Association held at Glenmary Bungalow on Saturday, 27th January 1912, at 10 a.m.

PRESENT.—Messrs. W. H. G. Leahy (Chairman), F. Bissett (Vice-Chairman) D. McArthur, T. C. Forbes, K. E. Nicoll, J. F. Fraser, H. C. Westaway, J. H. Cantlay, E. G. Cameron, T. A. Kinmond, A. R. St. George, W. A. Milner, E. C. Evans, R. E. Haslam, F. W. Winterbotham, W. N. Ford, F. E. Thomas (by proxy) W. G. Haslam, G. H. Davey and W. F. Forbes (Visitors) and J. S. Wilkie, (Honorary Secretary.)

The Minutes calling the meeting were read.

The proceedings of the last general meeting were confirmed and taken as read.

CHAIRMAN'S ADDRESS.

Gentlemen :—" I see in the Agenda Paper the Chairman is put down for an address. I will only briefly allude to our local 'politics' in my address, as you will find our Honorary Secretary has touched on every subject of interest in his annual report, which you will hear presently, so I propose to 'generalize.' The past year has been a prosperous one for the majority of tea producers, the distinct rise in prices during the latter half of 1910 being further improved on.

From the latest figures available the 1911 crop was a record one, from India and Ceylon, and represented 296,000,000 lbs. tea on which duty was paid, and what is most surprising, but none the less gratifying to us, is that, in spite of the record crop, there was a steady improvement in values and the average price of Indian Teas reached the high figure of 8'91*d*., an advance of '61*d*. on last year. These figures we are aware had not been previously reached since 1897 and 1898. Had we not experienced abnormal weather in the way of a sharp drought in the beginning of the year and then two months of heavy rain in the first two months of the S. W. monsoon, our crops would have been above the average, but as we were compensated for these drawbacks by the steady and increased prices, we may fairly congratulate ourselves on a successful season.

I think now that the output of tea from Travancore has reached a decent figure, we are beginning to be recognised as of some importance in the home tea market and at last 'coming into our own.' It is gratifying to note in the figures for 1910 (I have not got them yet for 1911) of yields of the districts in the whole of India, that Travancore comes out a very good second with 567 lbs. per acre, being only beaten by 15 lbs. per acre by the Jalpaiguri district for top yield. Another pleasing feature about Travancore teas you will find in Messrs. Gow, Wilson and Stanton's annual review, for of Travancore it is said, that " during recent months several invoices with attractive flavour and quality have been placed on the market."

What may be in store for tea producers in 1912 is hard to foretell; what we have most to fear, I think, is the general labour unrest at home, which may upset our calculations at any time; otherwise everything points to the present year being a favourable one to us, especially if we take into consideration the revolution in China and the introduction in America of the Pure Food Act, as it applies to 'coloured' tea from China.

Our labour supply has, I think, been sufficient for all purposes and we are as well off as, if not better than, any districts in S. India. Whilst on this subject you are all aware there is some diversity of opinion in S. India planting districts as to whether Assistants to the Scientific Officer are so necessary as tackling the labour question in some shape, and we shall have to decide in which direction we will spend money. To carry out the directions of Scientific Officers for the prevention of pests, blights and diseases you have to go in for cultivation (at times high cultivation), for this you require a better supply of labour—well you want your labour first, and so I think we should follow Mr. Aylmer Martin in his proposals to try and induce coolies not to emigrate when there is ample work for them in their own country. I was somewhat severely taken to task by a Ceylon paper in 1910 when I suggested we should "go for" the professional native recruiters, by issuing pamphlets in the vernaculars all over S. India as a counterblast to the methods of the undesirable native recruiters, but I now see the Straits and Ceylon recognize the undesirability of the professional native recruirers and recommend that they should be banned. We cannot and do not object to legitimate recruiting and all we want to do is to let the coolies know we can offer them work and a good livelihood as do other countries, and I think we should follow Mr. Aylmer Martin, who knows more about recruiting and labour problems than most of us.

That some endeavour will soon be made by native land-owners to induce Government to take steps in the matter of emigration is evident from the way the subject has been prominently brought up and discussed at the last National Congress and by various Associations of native land-owners and by the Mysore State. A subject which we may have to turn our serious attention to, is the recent starting of thefts of tea whilst in transit. Several of us have had bitter experience of this kind last year, when chests and half chests were stolen. If these thefts continue, we shall have to go to Government for help in the way of legislation.

There is one more subject to which I must allude, it is an important one and that is the 'unsymphathetic attitude' the Travancore Government have of late adopted towards planters.

We have not only had our land tax increased, but the price of grass-land has been 'jumped' from Rs.10 to Rs.25 per acre, and on top of this tolls have been put on the main roads in three planting districts. It looks to me as if the Travancore Government had quite an erroneous idea of the prosperity of tea planters. We admit we are 'on top' just at present, but I would like to point out to Government that for 12 years (up to 1908) the largest Companies and Proprietors had not been able to declare a dividend beyond 2½% to 3% and we have yet to make up tremendous leeway to recoup ourselves for the capital sunk in the country. We could understand Government asking us to contribute more to their Exchequer if we had had a sequence of 5 years or more of present prices, but the tea market at home is about as uncertain as the British climate, and rises and falls when least expected. There appears to be an idea abroad amongst Travancore Officials that Government establishments in the planting centres are worked at a dead loss and that the cost of establishments is not paid for by land taxes. The lakhs of rupees that have accrued to Government from land-sales is carefully not mentioned when the subject is broached nor the other numerous sources of income, such as the income from salt and tobacco, etc., and if these officials would only stick to facts and figures, they would, like ourselves, find that the Travancore motto, "Charity is our household Divinity," is least applicable to any planting district.

In conclusion, Gentlemen, I have to thank you very much for electing me as your Chairman for the past two years, and to thank the Committee and the Honorary Secretary for their advice and services which have been so kindly given me at all times.

I now resign the Chairmanship."

THE HONORARY SECRETARY'S REPORT.

"Mr. Chairman and Gentlemen:—During the year under review 5 Committee Meetings and 3 General Meetings have been held.

Theni Bridge.—Your Honorary Secretary in his report for 1910 intimated that this bridge was under construction. I understand it is now nearing completion, and we hope the year 1912 may see it opened for traffic.

Roads.—I think it is the general opinion that the District roads are in better repair than they were 12 months ago. The bridge at 2nd mile Cardamom hill road has been temporarily opened for traffic and will be completed ere the monsoon sets in. The Sub-Division Officer has strongly recommended to Government certain improvements on the Cardamom Hill and Glenmary Roads and an estimate has been rendered for a larger number of covered drains and parapets. I hold a guarantee that Government will sanction an adequate sum for putting the Kudua-Ladrum Road in proper repairs.

Kottayam-Kumili Road.—The Western Ghat from Mundakayam to Araday has been put in good condition during the monsoon, and I understand the portion from Araday to the Eastern Ghat is in course of repair.

Toll.—Regarding the toll of 4 Chuckrams per cart levied on this road, Government explain their action in that the average annual expenditure on the up-keep for the past seven years amounts to Rs.50.900. I have written pointing out that both taxes and the price of land have been raised and in consequence asking them to reconsider this imposition, but as yet have received no reply.

Green Tea Bonus.—The proposal to revive the bonus on this was brought forward at a meeting of the India Tea Cess Committee held last February by Mr. A. D. Jackson but was defeated by one vote.* I understand this matter is again to be brought up shortly.

Scientific Officer.—The question of increasing subscription to the Scientific Officer Fund was brought forward during the year, we intimating that we were not prepared to pay an enhanced subscription.

Veterinary Hospital.—Government have intimated that this must lie over for the present.

Labour Rules.—These as existing last year (1910) continue to hold good, but it is surely a matter for regret that the District is not unanimous regarding them.

Membership.—The Association consists of 17 members, representing a declared acreage of 9,087½ acres.

Crop for 1911.—The total crop is 5,062,928 lbs. from a mature acreage of 8,576, representing an average of 590 lbs. per acre.

[* This is an error; there was only one vote, Mr. Jackson's, *in favour of* the proposal to revive the bonus].

ACCOUNTS.

Receipts.		*Rs.*	*a.*	*p.*
By balance from last year	...	720	11	9
By Subscriptions for 1911	...	1,135	13	10
By Bank Interest	...	65	11	0
Total Rs...		1,922	4	7

Expenditure.		*Rs.*	*a.*	*p.*
To Expenditure for 1911	...	1,022	4	7
To Balance to be carried forward	...	900	0	0
Total Rs...		1,922	4	7

Lady Ampthill's Nurses Institute.

By Subscriptions		...	90 0 0
To remitted to Secretary L. A. N. I.	Rs. 90 0 0		
Total	Rs. 90 0 0		90 0 0

Detailed Accounts are laid on the table.

I thank you, Gentlemen, for the honor you have done me in electing me your Honorary Secretary, and I now beg to tender my resignation.

Correspondence.—Read letter from Mundakayam Planters' Association *re* Toll at Kanjirapally Bridge.

Proposed by Mr. Fraser and seconded by Mr. Cantlay: That this Association support the Mundakayam Association's resolutions and do not pay the toll for the next three months from February 1st 1912.

Read letters from the Secretary U.P.A.S.I. No. 64/11 dated 4th October 1911, No. 66/11 dated 1st November 1911, No. 67/11 dated 7th November 1911, No. 68/11 dated 30th November 1911, No. 70/11 dated 15th December 1911, No. 71/11 dated 15th December 1911, No. 72/11 dated 18th December 1911, No. 73/11 dated 18th December 1911.

The Meeting confirmed the Honorary Secretary's letter of 30th December 1911 stating the Association were not prepared to pay a further cess. Read letters No. 1/12 dated 2nd January 1912, No. 2/12 dated 6th January 1912.

Read letter from Messrs. Peirce, Leslie & Co., Ltd., dated 13th January 1912, intimating that they have sent Rs.250 to the Secretary, U.P.A.S.I. being, a donation to the Planters' Benevolent Fund from all their branches.

The Honorary Secretary was asked to circulate members with a view to collecting subscriptions at once.

Read letter from the Sub-Division Officer, P. W. D. No. 4, dated 15/1/12, No. 11 dated 25/1/12.

Read letter from the Chief Engineer, dated 17th November 1912.

Read letter from the Post Master General, dated 20th October 1911.

Read letter from the Chief Secretary to the Government No. 5058, dated 3rd November 1911, and No 9695, dated 25th November 1911.

Read letter from the Superintendent Cardamom Hills.

Read letter from Mr. Aylmer Martin, dated 23rd December 1911.

Read letter from 1st class Magistrate Peermade, dated 17th January 1912. It was proposed by Mr. Westaway and seconded by Mr. McArthur: " That those Associations affected by this new ruling of the Travancore Government High Court as regards the date within which complaints should be prepared under the Travancore Breach of Contract Regulation be approached with a view to getting a High Court Ruling and sharing the expenses of same."—Carried unanimously.

The Honorary Secretary was instructed to write accordingly.

Accounts.—Proposed by Mr. R. E. Haslam and seconded by Mr. T. A. Kinmond: " That the accounts be passed and adopted and that the subscriptions for the year 1912 be at the rate of 1½ annas per cultivated acre and that a typewriter be bought for the use of the Honorary Secretary."—Carried unanimously.

Roads.—Proposed from the Chair: "That Messrs. T. C. Forbes, J. H. Cantlay, R. E. Haslam and the Superintendent of Glenmary be appointed to form a Road Committee for the year 1912."

Proposed by Mr. W. G. Haslam and seconded by Mr. D. McArthur: " That this Association be asked to approach the Travancore Government and ask them to erect a new bridge over the river at the foot of the Mannan's Crook Hill, the old one after many years of repairs having fallen into a dangerous condition."—Carried unanimously.

The Honorary Secretary was instructed to write accordingly.

District Labour Rules.—Mr. T. C. Forbes proposed that the Labour Rules be abolished, and after discussion he withdrew his resolution.

Fitter Fund.—The Accounts were laid on the table by Mr. J. H. Cantlay the Honorary Secretary and explained.

Proposed from the Chair: " That unless the Committee think a lathe necessary no cess be levied during the year and if considered necessary a cess of 6 annas per 1,000 lbs. Tea be levied; and that Messrs. J. H. Cantlay, F. Bissett and the Superintendent Glenmary do form the Committee for 1912."—Approved.

Medical Fund.—Mr. Cantlay, the Honorary Secretary. read letters from Dr. Lindsay, when the meeting empowered the Committee to deal with same.

Election of Office Bearers for 1912.—On a vote being taken the following were appointed.

Chairman	... Mr. F. Bissett.
Vice-Chairman	... Mr. T. C. Forbes.
Honorary Secretary	... Mr. R. E. Haslam.

Committee.—Messrs. D. McArthur and J. A. Richardson.

With a vote of thanks to the Chair the meeting terminated.

(Signed) J. S. WILKIE,
Hon. Secretary.

Shevaroy Planters' Association.

Proceedings of a Quarterly General Meeting held at Yercaud Victoria Rooms on Tuesday, 13th February, 1912.

PRESENT.—Messrs. S. Campbell, F. Carey, R. A. Gilby, P. Goubeat, S. M. Hight, W. W. Hight C. G. Lechler, W. I. Lechler, E. Large, W. Rahm, C. Rahm, F. D. Short, Revd.—Rochet, and Ch. Dickins (Honorary Secretary and Chairman).

(1.) The notice calling the meeting was taken as read.

(2.) *The Financial Position.*—Read Circular No. 68/11 of 20th November from Secretary, U. P. A. S. I., letter dated 8/2/12 from Secretary, W. P. A., and letter dated 9/2/12 from Mr. B. Cayley. Proposed from the Chair, seconded by Mr. W. I. Lechler and carried unanimously: "That the subscription of the S. P. A. be raised from Rs.20 to Rs.30 per annum per estate to include all subscriptions except the P. B. F. thereby enabling this Association to meet its share of the enhanced subscription to the U. P. A. S. I.

(3.) *Estates on the Pulneys.*—With reference to Mr. Barber's letter dated 21/10/11 and resolution passed at Committee Meeting of 5/12/11, it is hereby unanimously resolved that the Seven Estates on the Pulneys be heartily welcomed as members of this Association on the same terms and conditions observed by other members of this Association.

(4.) *Cattle Pound to be established on the Green Hills.*—Read letter dated 10/1/12 from Revd.—Rochet. Proposed by Revd.—Rochet, seconded by Mr. C. G. Lechler, and carried unanimously: "That the Honorary Secretary be requested to write to the Collector and District Magistrate, Salem, asking if he will kindly issue orders to have a Cattle Pound opened on the Green Hills.

(5.) *Complaint against a Village Munsiff* and with reference to resolution passed at Committee Meeting of 5/12/11. Read letter dated 19/2/12 from Collector and District Magistrate, Salem. Resolved: "That the Honorary Secretary send a copy of the Collector's letter to Mr. J. C. Cobbe."

(6.) *Enticement of Labour.*—Read Circular No. 69/11 dated 22/10/11 from Secretary, U. P. A. S. I. Resolved: "That the facts of the case should be brought to the notice of the Ceylon Labour Commissioner by the U. P. A. S. I."

(7.) *Labour Circulars.*—The meeting resolved that the Honorary Secretary be requested to write to the Secretary, U. P. A. S. I., and order 1,500 Labour Circulars in Tamil.

(8.) *U. P. A. S. I. Exhibition.*—Read circular No. 8/12 dated 6/2/12 from Secretary, U. P. A. S. I. Resolved: "That the Honorary Secretary be requested to inform the Central Association that the exhibition should be repeated this year."

(9.) *Enquiry from Department of Agriculture in U. S. of America.* Read letter dated 31/1/12 from Secretary, U. P. A. S. I., *re* information to be supplied to the Department of Agriculture, U. S. of America. Resolved: "That the out-put of Coffee from this District being so small, the Association deem it, unnecessary, unless good reasons could be shown, how it would benefit this Association and others."

(10.) *Commission on High Prices.*—Read letter No. 117/R & G of 11, dated 24/1/12 from Collector and District Magistrate, Salem. Resolved: "That, as none of the members of this Association have made this a matter of study, the Collector and District Magistrate, Salem, be thanked for his letter and informed that they do not feel competent to give categorical replies to the questions.

(11.) *Indian Currency.*—Read and recorded Circular No. 66/11 of 1/11/12 from Secretary, U. P. A. S. I.

With a vote of thanks to the Chair the Meeting terminated.

(Signed) CHARLES DICKINS,
Hon. Secy., S. P. A.

South Travancore Planters' Association.

Proceedings of Annual General Meeting held at Quilon Club, on Saturday, 3rd February, 1912.

PRESENT:—Messrs. J. Stewart (Chairman), D. G. Cameron, J. S. Valentine, L. G. Knight, J. B. Cook, H. C. Seymour, C. Brander, H. S. K. Morrell, H. W. Heberden. J. H. Parkinson, Chas. Hall, and A. W. Leslie (Honorary Secretary.) *Visitors*: Messrs. J. Mackie, Thornton, Clare, Cree, and Mackie.

The minutes of the previous Meeting having been read and confirmed, the Chairman reported as follows:—

Gentlemen,—There is very little on the agenda to-day except the usual formal business connected with our Annual General Meeting. We had four meetings during the year, and the subjects which received most attention are:

U.P.A.S.I.—Our representative, Mr. Cook, supported the various matters in which we were interested; and he will give us his report later on.

Occupation of Forest Bungalows.—The Conservator is going into this matter and will write us soon.

Tenmalai Station Goods Shed.—We applied for extra accommodation at this station, and the Railway Company are giving us what we wanted.

Kalthuritty Main Road Bridges.—Government has started on the two bridges between Tenmalai and Ariyankavoo, and it is hoped they will be completed before the monsoon.

Planters' Ward, Quilon.—Rs.25,000 has been sanctioned for two European wards, which, when completed, will be a great advantage to planters in this district.

Planters' Benevolent Fund.—Rs.360 has been subscribed by members of this Association this year, against Rs.550 in 1910-1911. These amounts were duly remitted to U. P. A. S. I. Secretary, Bangalore, and it is hoped that all members will again show their generosity towards this excellent scheme.

The Honorary Secretary will now give you his report and present the year's accounts for adoption.

The Honorary Secretary then presented the year's accounts, and these were passed, which show a credit balance of Rs.440-11-2.

Bangalore Delegate's Report.—Mr. J. B. Cook read his report as follows:—

Mr. Chairman and Gentlemen,—I do not think it is necessary for me, at this very late date, to give you an account of the proceedings of last year's meeting of the U. P. A. S. I. at Bangalore from start to finish. I have almost forgotten what happened: but many months ago the daily papers and the *Planters' Chronicle* kept you well informed on the subject. I will, therefore, only touch on the matters that interested our Association at that time.

Taking first, the Scientific Officer's Assistant; This matter came forward on Tuesday. Mr. Danvers, of North Mysore, told the Meeting that Mysore were getting a Scientific Officer for themselves, whether the other Associations joined or not. This Officer will be stationed in Mysore, and under the control of the U. P. A. S. I., but works for Mysore alone; or, I believe, any other adjoining district that may be taken in later. None of the charges will fall on other Associations—outside the combine—and all information he obtains will be at the use of the U. P. A. S. I. and come to us, through Mr. Anstead and the *Planters' Chronicle.*—This will greatly relieve our U. P. A. S. I. Scientific Officer, and give him more time for other Associations, and I consider it very generous of Mysore to do this. As instructed, I said that one Assistant Scientific Officer was sufficient at present. Through Mysore's action, we get this for nothing, which seems to me to entirely meet with both sections of opinion in this Association, *viz*: as an Association we were willing to pay towards one Assistant. On the Wednesday of the U. P. A. S. I. Meeting however, I received a telegram from our Honorary Secretary saying that a large Section of our members objected to an Assistant Scientific Officer. That wire was, however, too late, and I had already acted on my instructions from the Meeting of the 29th July. As the objectors have nothing whatever to pay for the Mysore Assistant, Mysore's action should meet their views.

Tea Cess.—Mr. J. Carson Parker was unanimously elected as member of the Tea Cess Committee, and the U. P. A. S. I. decided to ask for a cess of 6 pies per lb. on 4,000,000 lbs. green tea for the year.

Labour.—South Indian planters generally are finding labour harder and harder to obtain. As a large number go to Ceylon, the Straits, Burmah &c., the parent association has decided to issue a circular warning natives against emigration when they can get good pay and work in their own country. These circulars when ready—please remember I am speaking of six months ago—will be sent to each District Association Secretary for distribution in their labour obtaining districts. There will be a blank at the foot of the general circular, so that each District can add what it considers suitable, as showing the advantages to be obtained by the cooly on their estates.

Finance.—It was decided to ask all District Associations to subscribe on an acreage basis of 2 annas per acre to the U. P. A. S. I. This would cover everything we require to pay to the parent Association for all its benefits. If you work out what we paid for the last year, it comes to 1 as. 6·21 pies per acre, which is less than nearly all the other Associations pay. The U. P. A. S. I. must have 2 as. per acre to carry on its work properly, it is no use going on from hand to mouth like the cooly. The Association must be in a position financially to do away with subscribing so much to the parent Association, so much to the Scientific Officer Fund, so much to Laboratory Upkeep, &c. &c.—these have nothing to do with the Mysore Scientific Officer, who is paid entirely by the Associations that have combined. The 2 as. is for the U. P. A. S. I. and will place it on a fairly sound financial basis. The Planters' Benevolent Fund is, of course, quite a separate thing.

A reprint of various articles in the *Planters' Chronicle*, brought up to date, is to be published. That is, there will be pamphlets or books on each subject, containing all that has appeared about them. This will be available through your Secretary, or the U. P. A. S. I. office. There was a small Exhibition held in the Office of the Association, and some very nice Rubber biscuits were shown by the Malayalam Co. and Poonmudi. But our neighbour the Periyar Co. had the largest show; from young trees to Blanket, Crepe, and worm. This will probably be an annual exhibition, and having seen it, I must ask you all to support it very much more than last year. I know that in tea and rubber we can send the equal of any other Association and trust if Exhibitions are held annually we will show that we can uphold the south end of India against all comers.

Mr. Cook was cordially thanked by the meeting.

U. P. A. S. I. Subscription.—Mr. Valentine proposed and Mr. Cook seconded that the subscription to the U. P. A. S. I. be increased to annas 2 per acre. As an amendment, Mr. Knight proposed, seconded by Mr. Heberden, that the increased subscription be paid only if all other Associations follow suit, the Amendment was carried.

Elephant Pits.—Government having been thanked for their reward of Rs.200 for the capture of every elephant, it was proposed by Mr. Heberden and seconded by Mr. Knight: That Government be asked to take delivery of elephants, as soon as possible after being advised of their capture, and that they make their own arrangements for removal.—Carried.

Game Laws.—Proposed by Mr. Knight and seconded by Mr. Heberden: That Government be asked not to make any notification restricting area, or appointing a close season before they consult the planters in the district to be affected by such notification.—Carried. Further it was proposed by Mr. Cameron and seconded by Mr. Heberden: That Government be asked to make penal all dynamiting of fish in all the rivers and tanks in Travancore.—Carried.

Mr. Cook's Resolution.—That the Meetings of this Association be held quarterly instead of bi-annually, was seconded by Mr. Morrell and received the unanimous support of the meeting.

Kalthuritty Railway Station.—Proposed by Mr. Knight and seconded by Mr. Stewart: That the Railway Company be written to to consider a siding at Kalthuritty, and that the Post Office authorities be asked to join in the application.—Carried.

Election of Office-bearers.—The retiring Chairman and Honorary Secretary having been thanked by the meeting they were both unanimously re-elected for the ensuing year.

A vote of thanks to the Chair closed the Meeting.

(Signed) A. W. LESLIE, *Hon. Secretary.*

Anamalai Planters' Association.

Proceedings of the Ninth Annual General Meeting of the Anamalai Planters' Association held at Paralai Bungalow at 2 p.m. on Monday, 12th February, 1912.

PRESENT.—Messrs. G. A. Marsh, G. L. Duncan, E. W. Simcock, H. W. de Salis, J. H. Robinson, A. C. Cotton, J. O. K. Walsh, J. I. Jones, M. B. P-Urquhart, S. C. Reilly, and C. H. Brock (Chairman). *By Proxy*, Mr. S. W. Hoole.

1. HONORARY SECRETARY.—The Chairman read a letter from Mr. C. R. T. Congreve regretting his non-attendance at the meeting owing to ill-health, tendering his resignation as he is leaving India shortly, and thanking the General Committee for their unfailing help throughout the year.

Mr. de Salis proposed a hearty vote of thanks to Mr. Congreve. This was seconded by Mr. Duncan and carried unanimously.

2. CHAIRMAN'S ADDRESS AND ANNUAL REPORT.—The Chairman addressed the meeting as follows:—

"Gentlemen,—Owing to serious illness of your Honorary Secretary he has been unable to present you with a Report of the year's work. You have all been fully informed, from our printed proceedings, of the work that the General Committee has been carrying on for you since the last Annual Meeting, and so a report on the year's work can only mean repeating to you a great deal of what you already know. I will therefore only draw your attention to a few points of general interest.

"ROADS.—This Association has been steadily endeavouring to get the work on the roads here attended to more thoroughly and expeditiously than has been the case of late years, but with little success. A letter has been recently received from the Executive Engineer which will be read to you at this meeting, and which only shows that the D. P. W. Officials in this district not only do not appear to know exactly what work is being done on our roads, but also do not realise that all we are continually asking for is that the allotments made for the year should be fully spent on their steady upkeep, and not be wasted by only rushing through a lot of work late in the season when proper consolidation is impossible for want of rain.

"LABOUR.—I regret to say that we are in no better position as regards Labour problems than we were a year ago, and, in fact, I may say the present position is infinitely worse than ever before and some of the methods of recruiting in vogue have sunk to such a degrading depth, that the prospects of future developments can only be viewed with the gravest alarm. I will not dilate on the derision that the opinion of your General Committee has met with from the executive of the U. P. A. S. I. except to assure you that it has largely been due to a misunderstanding of what this Association is striving for, and I trust that this meeting will discuss the subject fully and show others that any decisions we arrive at are by no means due to any feeling of hostility.

"HOSPITAL.—We are still waiting patiently, or rather impatiently, for the building of the promised Dispensary. We have subscribed to the Hospital up-keep Fund that we guaranteed, and we have had a Sub-Assistant Surgeon appointed, but had it not been for the courtesy of the Stanmore-Anamalai Tea Estates Co., he would have had nowhere to lay his head. Apparently every time we ask for something to be done soon, the plans which are before the Medical Board, and which have been before them for more than a year, are shelved for a further period.

"PREVENTION OF COFFEE STEALING.—The District Superintendent of Police has again given us special police patrols, and, on the whole, the results have been very beneficial.

"At the beginning of the year, owing to the steady increase of the work of this Association, the Honorary Secretary was voted a clerk's allowance, and this has enabled our Honorary Secretary to deal with all correspondence and other work more promptly.

"In conclusion, I have to place my resignation in your hands, and in doing so I can only regret that my work on your behalf during the past two years has not always satisfied everyone."

The Address and Report was adopted, and a cordial vote of thanks to the Chairman was carried unanimously.

3. ACCOUNTS.—The Chairman then read out a summary of the year's accounts. The accounts had been audited by Messrs. Urquhart and de Salis and were passed by the meeting.

OFFICE BEARERS.—The following were elected as Office Bearers for the year:—

Chairman ... Mr. G. A. Marsh.
Vice-Chairman ... Mr. G. L. Duncan.
Honorary Secretary ... Mr. J. H. Robinson.

The meeting proposed Mr. G. A. Marsh for nomination to the Coimbatore District Board.

5. REPORT OF DELEGATE TO THE U. P. A. S. I. MEETING.—The Chairman read a letter from Mr. E. F. Barber embodying his Report. The meeting unanimously expressed their cordial thanks to Mr. Barber for representing the Association at the meeting.

6. MEDICAL AFFAIRS.—Read letters from the District Medical Officer, dated 6th January, 1912, and from the President, Taluk Board, Pollachi, dated 16th October 1911.

After a good deal of discussion the meeting unanimously noted with satisfaction that the present Sub-Assistant Surgeon was likely to be replaced by a better man, and some members notified that if another man was not appointed they would have to consider withdrawing their subscriptions.

The Honorary Secretary was instructed to write to the President, Taluk Board, Pollachi, with reference to the remittance of subscriptions.

7. GRANTS OF LAND.—Read letter from the District Forest Officer dated 22nd January, 1912. The following resolution was proposed by Mr. Duncan and seconded by Mr. Robinson:

> "That a Sub-Committee be formed to consider which block of land "should be reserved for future public buildings and recreation "ground."

The resolution was carried unanimously, and the meeting appointed Messrs. Duncan, Marsh and Simcock as the Sub-Committee and instructed them to place the result of their deliberations before the Association at an early date.

ROADS AND COMMUNICATIONS.—Read Honorary Secretary's letter to the Executive Engineer, P. W. D., dated 3-11-11 and the latter's reply dated 24-1-12.

Mr. Duncan spoke very strongly on some of the points expressed in the letter of the Sub-Division Officer, and proved to the meeting that some of the statements made in it were absolutely false and that it showed total ignorance of what work had and had not been done. His remarks were verified by several members.

Mr. Marsh then severely criticised the remarks made by the Executive Engineer in his endorsement on the Sub-Division Officer's letter. Some of the repairs asked for by the Honorary Secretary had been carried out by the P.W.D. after the receipt of our complaints and in response to them, and yet after a lapse of 6 weeks the Sub-Divisional Officer writes as if he had done it all on his own initiative. He ridiculed the remark made by the Executive Engineer that everyone who was not a planter when they return from the Anamalais always remark on the excellent condition of the Ghaut Road and mentioned the names of three Government Officials who had expressed a very different opinion. He also expressed surprise that a P.W.D. Official should so lower the prestige of the P.W.D. work as to compare it with Local Fund Work.

The meeting endorsed the remarks made by Messrs. Duncan and Marsh and instructed the Honorary Secretary to write to the Executive Engineer on the subject.

The Chairman then read the U.P.A.S.I. Circulars Nos. 2, 3 and 4, which were recorded.

9. NON-SERVICE OF WARRANTS.—The meeting recorded its satisfaction that the measures adopted by the District Superintendent of Police had improved the serving of warrants considerably.

PREVENTION OF COFFEE STEALING.—The meeting recorded its thanks to the District Superintendent of Police for again arranging Police Patrols during the Coffee season, and expressed its satisfaction at the way Mr. S. Vaidyanathan, Probationary Sub-Inspector of Police, had carried out his duties in connection with the same.

11. POSTAL AND TELEGRAPH AFFAIRS.—Read letter from Mr. Duncan, dated 5-2-12. The Honorary Secretary was requested to communicate with the Post Master-General urging him to establish a Departmrntal Post Office on the Anamalais, and there are now 30 Europeans in the District and over 10,000 native inhabitants. Also to urge that the telegraph line be extended to Maliandipatanam P.O. Also to urge that the existing Valparai P.O. be allowed to receive Foreign Telegrams for despatch, and to protest against the utter incompetence of the present, so-called Post Master.

12. U.P.A.S.I. FINANCE AND LABOUR PROBLEMS.—Read U. P. A. S. I. Circulars 1 and 7. Mr. Marsh proposed and Mr. Simcock seconded the following resolution, which was carried unanimously:—

"That, while approving generally of the opinions expressed by the General Committee at their meeting on the 5th December last, this Association wishes to clearly and emphatically press for some *united action as regards Labour Problems* and, in particular, against unfair methods of recruiting, and postpones the consideration of Finance until after the next General Meeting of the U.P.A.S.I.

13. BRAKE LOGS ON BANDIES.—Read letters from the District Forest Officer, dated 15th December 1911 and 28th January 1912, the latter notifying that the maximum diameter allowed for Brake Poles will be reduced to 6 inches with effect from the 15th February, 1912.

14. CORRESPONDENCE.—The following were read and recorded:—

(*a*) U.P.A.S.I. Circular No. 5 and the Chairman's reply, dated 29-1-12.

(*b*) Letter from Honorary Secretary. S.T.P.A., dated 11-1-12, and the Chairman's reply dated 29th January 1912.

(*c*) Proceedings of the Committee of the Ceylon P.A., dated 12-1-12.

(*d*) U.P.A.S.I. Circular No. 6. The meeting was of the opinion that this subject should receive prompt attention from the Indian Tea Cess Committee.

15. NEW MEMBER.—Mr. Chas. Howland was elected a Member of the Association.

16. RULE No. 7.—After considerable discussion, the meeting decided to make no alteration in this Rule.

17. Before the meeting closed Mr. Marsh said that he wished to express his very great regret that Mr. Brock was leaving the District very shortly. He was quite sure that every member of the Association heartily appreciated all the work that their Chairman had done for them and his departure would be a loss to the Association.

Mr. Brock thanked Mr. Marsh and all Members for their expression of appreciation and for all their good wishes.

(Signed) J. H. ROBINSON,
Honorary Secretary.

CORRESPONDENCE.

Protection of Cattle.

Dear Sir,—I shall feel obliged by your publishing the enclosed aims and objects of the British Association for the protection of Indian cattle in an early issue of your paper.

The advantages that would result to Great Britain from better agriculture in India, particularly the increased produce of better-stapled cotton, which gives employment to thousands of operatives in the Lancashire and Yorkshire factories, are too apparent to need comment, and it is requested that the matter will be referred to in the Editorial columns. . . .

45, Courthope Road, Hampstead, N.W.
Lndon, 18th Jan., 1912.

K. S. JASSAWALLA,
President-Founder British Association for the Protection of Indian Cattle,

[*Enclosure.*]

THE BRITISH ASSOCIATION FOR THE PROTECTION OF INDIAN CATTLE.

At a recent meeting of the Committee of the British Association for the protection of Indian cattle—an influential body lately formed in London—the following aims and objects were framed:—

1. To prevent the unnecessary slaughter of cattle in India with the view of increasing the number and improving the breed of the animals employed for the cultivation of the land.
2. By this means to encourage the agricultural development of the country and so render the United Kingdom less dependent upon foreign countries for her raw material.
3. To improve the general condition and promote the more humane treatment of cattle in India.

Membership (which is free) is warmly invited and those interested in the welfare of this humane cause are requested to communicate to the President who will be most pleased to hear from them at the address below.

K. S. JASSAWALLA.

Tea Drinking.

Dear Sir,—If we may rely upon the statements of authorities, who ought to know what they are talking about, it would seem that we have not yet exhausted all the merits of Tea drinking. The latest idea seems to be that Tea drinking improves the tone of the voice.

M. Bonnaire, the Agent General for the great International Musical Tournament which is to take place in Paris in May, is of opinion that Tea drinking improves the tone of the voice. He says, "as to the English choirs I maintain that there is nothing to touch them. Their purity of voice—which I attribute to the national beverage Tea—is unequalled by any nation in the world, except the Tyroleans."

The great Tea drinking country, Australia, produced a Melba and a Crossley, and many other singers. The mill-girls of Lancashire and Yorkshire, who lead the van of the harmonious army, are inveterate Tea drinkers. Mme. D'Ivarez, whose great contralto voice was a feature in the production of "Herodiade" at the London Opera House, believes that Tea is an excellent thing for singers. She was in the habit of drinking Tea during arduous rehearsals and before her appearance on the stage. "It is refreshing and steadies the nerves," she says. What will be the next idea?

J. J. MCKENZIE.

THE PLANTERS' ASSOCIATION OF CEYLON, KANDY.

Extracts from the Fifty-Eighth Annual Report for the year ending 31st December, 1911.

PLANTING PRODUCTS.

TEA.—As the Tea Crop for the year under review will be some six million pounds better than in 1910, it may be taken for granted that, on the whole, the season has been a favourable one.

The year began well, but the usual fine weather turned into a drought, which was unprecedently severe in certain districts, notably Matale and Haputale. The little monsoon was a failure, and consequently there was an almost total absence of the heavy flushing usual during the second quarter of the year. The more favourable weather of the closing months of the year has, in most districts, enabled the shortage to be caught up, whilst in districts not affected by the early drought crops are well above last season.

The up-to-date and systematic cultivation now in vogue on most estates is undoubtedly keeping up yields, and there is no sign of deterioration on estates that are regularly cultivated.

Few estates in Ceylon, however, are as free from weeds as formerly, and many are getting very bad in this respect.

Manuring, the improvement of the "tilth" of the soil, and consequent better growing conditions, and shortage of labour are doubtless the chief contributing causes, as also more careless weeding methods than in former days.

On all the older estates in the low-country districts, interplanted with Rubber, estimates for 1912 are likely to be considerably reduced, and many acres of Tea, becoming unproductive, are being gradually cut out.

This anticipated reduction in crops and the high prices now ruling for Teas of all grades has induced attention to be again turned to the opening up of new areas, and in the Uva and Sabaragamuwa districts in particular large extentions are being planted up with Tea.

Tea prices for the season have been very satisfactory to producers, and whilst the high average is due to the increased prices ruling for common teas, it is satisfactory to note that high-grown teas have slso participated in the rise in the average.

With lower stocks and a supply barely equal to the demand the outlook appears most promising.

RUBBER.

Extensions during the season have been on a very moderate scale, but the number of areas, of a few acres each, opened by small native proprietors is very noticeable.

Following on the usual dry season spells of rainless weather experienced in the early part of the South-West monsoon prevented the free flow of latex expected at this season, and again later in the year interference with tapping was marked by early morning rain, which is somewhat unusual during the N.-E. monsoon in the low-country.

Crop estimates have been generally realized and the yield of young plantations is promising.

Manuring of young Rubber has had very satisfactory results in the increase of girth, and incidentally therefore in bringing clearings into bearing at an earlier date than would have otherwise been the case.

The problem which now requires solving is the distance of planting and the advisability of systematically thinning out clearings as the trees get older. This problem requires the most earnest attention, or serious disappointment and loss may be sustained.

Methods of tapping have greatly improved and the standard of work is generally higher. The paring process is the one mostly in vogue, but pricking is successfully carried out on a few estates in one district with no apparent damage to the tree.

The necessity of leaving an untapped section of bark, or bark of not less than 3 years renewal, from crown to base, may be said to be pretty generally accepted.

Diseases of the root, stem and leaves have not proved very troublesome during the season, and those that have been investigated and described by the Government Mycologist should not be so, provided prompt measures are taken in dealing with all cases immediately there are signs of disease. . . .

There has been a good demand throughout the year for pale, even coloured Crepe of the blanket description which, with well prepared smoke-cured sheet, commanded satisfactory prices.

Uniformity throughout is looked for as much as anything on the market, and it is of the utmost importance to the future of the industry that badly cured or dried Rubber should not be exported.

With due attention paid to these essentials, Plantation Rubber may be expected to increase in popularity with the manufacturer, and thereby, it is anticipated, the increasing output for some years will be fully absorbed by one or other of the various markets.

In comparison with Fine Hard Pará the best sorts of Plantation Rubber have well held their own on the London market during 1911.

It is satisfactory to note that offerings on the local market are increasing rapidly, and that Colombo should soon become as important a distributing centre for Rubber as it is for Tea. The highest price realised locally, in the early part of the year for First Quality, was Rs.5'07½.

During the latter six months the market was easier for all sorts and Rs.3'05 was touched, closing steadier at the end of the year at Rs.3'25.

Total shipments for the year 7,154,658 lbs., against an estimate of 5,000,000—3,298,652 lbs. were exported in 1910 and 1,372,416 in 1909.

Thefts of Rubber from field and factory are considerably on the increase, but it is satisfactory to note that several convictions have been obtained and severe sentences inflicted in recent cases.

It is considered probable that greater activity on the part of Police and Headmen in following up clues would bring more receivers to justice, and this applies to Colombo as well as the producing districts.

CARDAMOMS.

The crop shipped 564,819 lbs. during 1911 included a large share of the previous year's harvest and the early spring gatherings.

The drought, one of the severest experienced for years, lasting at it did from 23rd January to June, and again a very hot and dry August and September caused a failure of blossoms and destroyed many of the racemes.

Short crops, declining shipments, and diminishing stocks in London and other markets gave an impetus to prices for all grades, closing with an increase of fully 9*d*. per lb. on each grade, thus giving a more cheerful outlook to growers whose crops were short of estimates.

With a favourable season, the present estimate of Cardamoms for 1912 is 550,000 lbs. only, as several of the older fields have ceased to bear paying crops and are being planted with tea, while the new acreage coming into bearing is very small.

A Cess of one Cent. per lb. on all Cardamoms shipped from Ceylon during 1911 was suggested by the Cess Committee for the purpose of continuing advertising this Spice of which so little is known. The proposition met with a fair amount of promised support, but not sufficient to carry on the advertising considered desirable.

COLOMBO TEA REPORT, 1911.

The feature of the 1911 local Tea Market was the high position of the average throughout the year—variation in quality caused a drop of 3 to 4 cents in June and July, but an improvement in August induced a steady rise which was maintained to the end of the year, the last month or so showing a further upward movement, in spite of declining quality.

The average in Colombo for 1911 was 45'53 against 42 in 1910. The Island did not produce "stand out" quality from any district this last season. There was a fair average from the Dimbula side, but Uva flavour was not up to anything like what was expected. Low and medium elevations sent useful liquors, but the Estates which scored most consistently, were those that had given attention to style, make, and appearance.

It is essential that more attention be paid to appearance if the Russian trade is to be retained. The result of rough make and stalky appearance (which was more marked this last season than for years past) has led to a decrease in shipments to Russia of about 3 million lbs.

The total quantity sold at Public Sale in Colombo for 1911 was 69,316,947 lbs., against 68,601,913 lbs. for 1910.

GREEN TEA REPORT, 1911.

The year under review has again marked a distinct increase in the production of Green Tea, which, bearing in mind the high prices which have been ruling for Black Tea generally, is distinctly gratifying. The local market readily absorbed the increased quantity at good prices, and producers have every reason to be satisfied with the result. The bulk of the increased production has been distributed between Russia and the United Kingdom. Shipments to Russia have shown an increase of about 70% as compared with 1910. In fact, the Russian market has taken practically one half of the total green Tea Crop of the Island.

Shipments to the Canadian market also show a satisfactory increase. But the United States have taken about ½ million lbs. less than in 1910. The decrease in the quantity of green Tea taken by the United States is no doubt partly the result of the new Ordinance debarring the entry of artificially coloured, or polished teas into that country. But now that the Trade is becoming accustomed to the altered conditions, there is evidence of an increased demand for "natural leaf" Green Tea, and prospects are good for 1912.

As only a very small proportion of the Green Tea Crop finds its way into Public Auction, it may interest the generally Planting Community to know that the average prices paid for low-country crops, for delivery during the year under review, created, in many cases, a record.

While the demand from foreign markets has maintained a high average price during the year, it is to be regretted that, generally speaking, manufacture has not shown improvement; in fact, the reverse has often been the case. Inattention to this very important factor cannot but, in the long run, have a detrimental effect on the Trade. Green Tea buyers attach great importance to the style and make of the dry leaf, and carefully manufactured teas will always command a premium.

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THE U. P. A. S. I.

(INCORPORATED.)

Proposed Bonus on Green Tea.

In a letter dated the 18th ultimo the Chairman stated:—

"I have received a telegram from Mr. Carson Parker referring to the discussion on the Green Tea Bonus at the Meeting of the Tea Cess Committee on the 16th inst., which reads:

"'Put up a good fight. Votes even. Chairman casting against me.'

"This change of opinion on the part of the Committee is very satisfactory to Planters who are in favour of the bonus, considering that last year our Representative, Mr. Jackson, was the only Member who voted for it. Our best thanks are due to Mr. Carson Parker for the work he has done to bring about this result. At the same time I have no doubt that the arguments put forward last year by Mr. Jackson must have had a good effect, though they did not influence the voting then."

The Scientific Officer.

Mr. Anstead returned from the North Mysore district on the night of the 25th ultimo. Addresses delivered by him at the meeting of the N. M. P, A. on the 22nd idem will be publised later.

Scientific Bulletins.

Inquiries having been made lately concerning the Scientific Bulletins to which reference was made at the last Annual Meeting, it is desirable to state that this matter has not been lost sight of, but has been discussed at intervals by the Scientific Officer and the Secretary. As was mentioned at the meeting, mere reprints of papers already published in the *Planters' Chronicle* would not constitute satisfactory Bulletins. The various papers relating to the particular subject selected must be revised and brought up to date: in some instances they will have to be partially rewritten or, at the least, re-arranged. Work of this kind, which will fall mainly on the Scientific Officer, will require time. It is hoped, however, that a start will be made at an early date. After that, the publication of a series will be proceeded with as time permits, always provided that planters give sufficient support to make the venture a success. It would be premature just now to publish a list of the subjects to be dealt with, or even to mention the first one to be taken up, for the selection will depend upon various circumstances. In regard to certain matters, where experiments are still in progress, the Scientific Officer is of opinion that the time is not yet ripe for the issue of Bulletins. In such cases, of course, it is better to wait till definite results can be given than to republish in bulletin form, statements which have yet to be verified by further investigation.

Scientific Officer's Papers.

XCI.—RUBBER EXPERIMENTS ON PERIYAR ESTATE.

Last September a Progress Report on the Manurial Experiments of the Malabar Coast Planters' Association presented by Mr. H. B. Kirk was published (*P. C.*, Vol. VI, p. 562). I have just received from Mr. Kirk the final report on these experiments, which have completed their first year's trial.

I. *Experiment to compare results between pollarding every other tree in a row and cutting out every other tree.*

Two rows of trees A and B were selected, the trees in which were 7 years old at the beginning of the experiment, the rows being 20 feet apart and the trees 10 feet apart in the row.

Thinning out in some form is necessary on this estate and will be necessary on other estates in the future since the network of roots in the soil and the interference of the crowns of trees planted at this distance has been found to diminish the yield of latex, and this experiment was designed to test the best method of doing this thinning out.

The pollarding was done with a view to finding out if the yield from the pollarded tree and the next tree to it added together would be very much more than from the single tree left after cutting out. It was intended to finally cut out the pollarded trees after one year's tapping had been done on them and to tap them to death during the last six months.

In Row A every other tree was pollarded at a height of 10 feet from the ground in May 1910. Tapping was begun on 1st December 1910 after they had all thrown out fine new shoots. The Row contained 96 pollarded trees and 96 untouched trees, the average girth at the beginning of the experiment being 21·4 inches at three feet from the ground.

In Row B every other tree was cut out and all the roots removed in May 1910. Tapping was begun on the trees left on 1st December 1910. This Row contained 93 trees, the average girth at the beginning of the experiment being 23·83 inches at 3 feet from the ground.

Between 1st December 1910 and 31st December 1911 the trees in each row were tapped 138 times, tapping being done on every alternate day. Owing to drought tapping was stopped from 19th January to 18th April 1911, and it was noticed that the pollarded trees suffered far more quickly and more acutely from the drought than the trees left in Row B.

The yield of rubber obtained each month is given in the following table :—

Months.	Dry rubber including Scrap in ounces per tree.		
	Row A.		Row B.
	Pollarded.	Untouched.	Untouched.
December 1910 ...	2·81	4·65	5·04
January 1911 ...	0·64	1·83	2·00
April ...	0·51	1·29	1·45
May ...	2·11	3·11	4·89
June ...	1·45	2·17	2·62
July ...	0·64	1·05	2·43
August ...	2·25	3·54	4·78
September ...	2·39	3·08	4·13
October ...	1·73	2·52	4·53
November ...	1·60	2·64	4·47
December ...	1·87	3·04	4·71
Totals ...	18·00	28·92	41·05

From this table it will be seen that the 96 pollarded trees in Row A gave a total yield of 18 ounces during the period of experiment while the alternate 96 untouched trees in Row A gave a total yield of 28'92 ounces. Thus the 195 trees in Row A gave a total of 46'92 ounces. In Row B the 93 trees left after cutting out gave a total yield of 41'05 ounces. It will be seen from the monthly yields also that the single trees in Row B are gradually increasing in yield and at the end of the experiment were giving as much as the two trees in Row A.

From this it is concluded that cutting out every alternate tree is the best method of thinning a thickly planted field.

II. *Experiment with Manures.*

Four rows of 7 year old trees were selected for this experiment, planted 20 feet by 10 feet.

Row C, containing 131 trees, with the average girth of 23'87 inches at three feet from the ground when measured in December 1910, received no manure, and acted as a Control Plot.

Row D, containing 130 trees with an average girth of 23'79 inches at three feet from the ground when measured in December 1910, received 5 lbs. per tree of the following mixture recommended by Mr. Kelway Bamber from an analysis of the soil:—

400 lbs.	Fish.
200 lbs.	Castor Cake.
50 lbs.	Sulphate of Ammonia.
120 lbs.	Blood Meal.
50 lbs.	Superphosphate.
100 lbs.	Steamed Bone Meal.
80 lbs.	Sulphate of Potash.
1,000 lbs.	

This contains 5'67% Nitrogen, 5'6% Phosphoric Acid and 4% Potash.

The Soil Analysis upon which this manure was based was as follows:—

MECHANICAL COMPOSITION.

Fine Soil passing 90 mesh	28'0
ditto 60 mesh	44'0
ditto 30 mesh	24'0
Coarse Sand and small stones	4'0
	100'0

CHEMICAL COMPOSITION.

Moisture	1'000
*Organic Matter and Combined Water ...	5'200
Oxides of Iron and Manganese	3'660
Oxide of Alumina	6'570
Lime	0'320
Magnesia	0'864
Potash	0'310
Phosphoric Acid	0'076
Sand and Silicates	82'000
	100'000
*Containing Nitrogen	0'095
Acidity	marked.

Row E, containing 132 trees with an average girth of 22'9 inches at three feet from the ground when measured in December 1910, received 5 lbs. per tree of the following mixture; recommended by the Scientific Officer for trial:—

500 lbs.	Basic Slag.
300 lbs.	Sulphate of Potash.
400 lbs.	Nitrolim.
1,200 lbs.	

This mixture contains 6% Nitrogen, 8'33% Phosphoric Acid and 12'5% Potash.

Row F, containing 136 trees with an average girth of 23'39 inches at three feet from the ground when measured in December 1910, received 2¼ lbs. of Nitrolim per tree.

In every case the manure was applied in exactly the same way; forked in 9 inches deep in two strips of four feet wide four feet away from the trees in the 20 foot line.

Tapping was done every other day from 1st December 1910 to 31st December 1911, there being a period of drought from December to April and 70 inches of rain in June and 53 inches in July, which interfered with tapping to a certain extent. Thus the trees in each row were tapped 15 times in December, 8 times in January, 7 times in April, 16 times in May, and 14 times in June. The trees were each tapped 138 times during the period of the experiment.

The results obtained in each month will be found in the following table:—

Month.	Dry Rubber including Scrap in ounces per tree.			
	Row C.	Row D.	Row E.	Row F.
December 1910 ...	4'75	5'33	4'28	3'82
January 1911 ...	1'31	1'52	1'32	1'22
April ...	0'73	1'44	0'77	1'05
May ...	0'79	3'08	2'52	2'76
June ...	2'29	2'37	1'87	1'85
July ..	2'04	2'42	1'98	2'23
August ...	3'40	3'22	3'28	2'66
September ...	3'17	3'10	2'88	2'62
October ...	2'97	3'08	2'99	2'82
November ...	3'33	3'38	3'41	3'27
December ...	2'83	3'87	3'33	3'15
Totals ...	27'61	32'81	28'63	27'45
Increase over no manure ...	—	5'20	1'02	0'16

In considering these results it must be remembered that they are obtained from one year's experiment only and that a year of excessive rain. Unfortunately the yield of each row before any manures were applied is not known.

The rainfall during the tapping season was as follows:—

December 1910	nil.
January 1911	0·26
February	0·26
March	2·75
April	5·15
May	21·15
June	70·05
July	53·68
August	14·37
September	6·28
October	16·78
November	4·63
December	11·86
	207·22

It is of interest to notice the effect of the manures upon the increase of girth, which is shown in the following table:—

	Row A	Row B	Row C	Row D	Row E	Row F
Average Girth in December 1910 in inches	21·40	23·83	23·87	23·79	22·90	23·39
Average Girth in December 1911 in inches	21·68	24·33	24·18	24·65	23·31	24·03
Average Increase in inches ...	0·28	0·50	0·31	0·86	0·41	0·64

Both as regards yield of rubber and increase of girth the manurial mixture advised by Mr. Bamber holds premier place and Mr. Kirk remarks in his report, "to a layman it seems to me that these experiments prove that it is useless to apply any manure without analysing the soil first, or knowing what it is like," an opinion which I heartily endorse.

The thanks of all Rubber planters are due to Mr. Kirk for carrying out these experiments so carefully and laying the results before us. Unfortunately he is now severing his connection with Periyar Estate, and it is to be earnestly hoped that under the new management the experiment will not be allowed to drop, but will be repeated in order to ascertain whether the same result will be obtained in future and more normal years, since very little can be concluded from only one year's trial.

RUDOLPH D. ANSTEAD, *Planting Expert.*

ASSIMILATION OF NITROGEN OF THE AIR BY FUNGI.

The Bulletin of the Torrey Botanical Club for 1911, p. 135, contains an account of trials that were conducted with Penicillium, *Aspergillus niger*, Alternaria and three species of Fusarium, for the purpose of determining if nitrogen from the air is fixed by these fungi. The results were negative in all cases, and the suggestion is made that the different experience of others who have made trial of the matter has arisen from errors in the manner of carrying out the work, or from confusion as to the actual fungi which formed the subjects of the experimentation. Support is given to the latter supposition by the circumstance that it appears that nitrogen can be fixed by some strains of fungi; while others that are very similar do not possess the property.—*Agricultural News.*

Notes and Comments by the Scientific Officer.

153. *Basic Slag and the Burial of Tea Prunings.*—A correspondent wishes to khow what the "functions" of Basic Slag are when added to buried Tea prunings and also when applied to the soil without the burial of prunings.

As Basic Slag contains free Lime there are very few manures with which it can be mixed or stored, and it is of little value when applied alone. If the Tea is fairly free from leaf diseases and root diseases, the light prunings should be buried with at least six inches of soil on the top of them. They should be buried as fresh as possible, as if allowed to dry up before burial much of their value is lost. Basic Slag at the rate of four to five cwt. per acre should be dusted over these prunings before they are covered up with soil from a tin, the bottom of which is perforated with holes. The free Lime in the Slag will destroy any latent germs or spores of fungi which are upon the prunings, and also hasten their decay, while the Phosphate will supply the deficiency of this plant food in the prunings.

When applied without prunings Basic Slag must be mixed with something else, as it supplies only one plant food, *viz.*, Phosphoric acid. On account of the free Lime which it contains it cannot be mixed with any form of Nitrate, or ammonia will be set free and nitrogen lost. Probably the best way to apply it to Tea is in conjunction with a green dressing. A mixture of two parts of Basic Slag with one part of Sulphate of Potash, should be worked into the top soil when the fields are clean at the end of the dry season at the rate of four to six cwt. per acre and a leguminous green dressing sown. This manure will enable the green dressing to make a rapid growth and after the rains it can be cut and dug in, thus supplying a complete manure to the Tea, the Nitrogen in which is supplied by the green dressing and has largely been obtained from the air by aid of the bacteria in the nodules on the roots.

154. *Tea Diseases.*—In the Annual Report for 1910-11 of the Agricultural Research Institute, Pusa, Dr. E. J. Butler, the Imperial Mycologist writes under the head of "Tea Diseases" as follows:—

"A Bulletin by Mr. W. McRae on the out-break of Blister Blight of Tea in Darjeeling District was published in July. It is unfortunately probable that the blight has come to stay in Darjeeling as it does not seem to have appreciably diminished since its first appearance. Many planters are experimenting on the lines suggested by Mr. McRae for its control but it is evident that effective measures will be most difficult to carry out."

The Bulletin mentioned was reproduced in the *Planters' Chronicle*, Vol. V, p. 303, and it is evident that the greatest care should be taken not to introduce this pest into South Indian Tea estates.

Continuing his report, Dr. Butler says, 'A Disease of Tea seed known for many years in Assam was investigated. It has been shown to be probably associated with the Tea seed bug *Poecilocoris latus* which punctures the seed and sucks the juice. Through the opening thus made fungi are able to enter, and the subsequent injury to the seed is due to the growth of one or other of several species of rot-producing fungi at the expense of the seed tissues."

RUDOLPH D. ANSTEAD,
Planting Expert.

CORRESPONDENCE.

Ceara Rubber in India.

Dear Sir,—I should be glad of any information on the subject of Ceará rubber. Are there any Plantations of it that pay? I mean in India.

Mercara. 21-2-1912. JOHN A. GRAHAM.

European Churches and European Schools in India.

At the instance of the Central Committee of the Fund for the improvement of European schools in India, the clergy and the ministers of the Church of England, the Church of Scotland, and all the Evangelical Free Churches throughout India agreed to set apart Sundays, the 18th and 25th February and 3rd March, as occasions for special prayers for the education of the Domiciled Community and for the distribution of literature bearing upon the Fund for the improvement of European schools.

In St. John's Church, Calcutta, last Sunday, the Bishop of Chota Nagpur appealed for greater interest in the education of the children, and in many other Churches similar appeals were made.

ALEXR. FRANCIS,
134, Corporation Street, *Hon. Secretary*,
Calcutta. All-India (Interim) Committee.

Improvement of Protestant Schools.

A good deal is being written just now about the Fund for the Improvement of Protestant Schools in India, and this paper has received a variety of literature on this subject, which is one that is likely to interest many planters.

In a letter dated the 19th instant, the Honorary Secretary at Calcutta remarks:—

"Influential meetings in support of this Fund continue to be held in various parts of England.

"Speaking at Worcester on 23rd January, Bishop Mylne, who has had long experience in work in India, said that the Eurasian in India has grave professional disadvantages. Cut off from manual labour, every service into which he might go was regarded as the happy hunting ground of the Brahmin. Take him altogether, there is no man in the world who needed more to have every advantage given him for a fair start in life. 'My single quarrel with the Government of India' the Bishop added, 'is that it never gives the Eurasians a chance. Millions of money are spent year by year on the education of the natives but it is difficult to extract a few thousands for Europeans and Eurasians.'"

The Fund now stands at over £96,000.

Herr Böhringer in *Der Tropenpflanzer* (1911, 15·496) draws attention to the over-production of cinchona in Java, and the low prices now ruling for bark. He considers that the area under cinchona should be reduced, and the land used for tea or rubber, preferably the former. These products would, he thinks, prove more profitable than cinchona, and the diminished production of the latter would raise the price.

Mr. Carberry Lumsden Egan, Superintendent of the Erramaculla Estate, Wynaad taluq has been authorized by the Government of Madras to witness the execution of labour contracts under the Madras Planters' Labour Act, 1903.

CAMPHOR.

The "Ibean Camphor" Tree of the East Africa Protectorate.

In a Report on the Forests of Kenia, East Africa Protectorate, by Mr. D. E. Hutchins (Colonial Reports, Miscellaneous, No. 41, Cd. 3561, 1907), attention was drawn to this tree, concerning which the following statements were made (p. 18):—

"The most valuable species in the Kenia Forest is a tree about which little has been known up to the present, and which for convenience may be termed Ibean camphor. The Kikuyu name is Mozaiti or Mozite. . . . . The green bark, green wood, and all the herbaceous parts of the tree have a camphoraceous smell. The structure of the timber and the seed vessel point to the tree being allied botanically to the true camphor (*Cinnamomum camphora*)."

The possible occurrence of a new camphor-yielding species in East Africa was a matter of considerable economic importance, and in response to a request from the Imperial Institute, specimens of the wood were sent from East Africa in June, 1908. They included two different kinds of wood: (*a*) planks 2½ inches thick, 9 inches wide and 5 feet 6 inches long, and (*b*) boards ¾ to 1 inch thick, 5 to 9 inches wide, and 2 to 3 feet long.

The thick planks were open-grained in structure and almost white, and when freshly scraped they had a slight odour recalling that of pine wood. The planks appeared to consist of sapwood, and should therefore, according to Mr. Hutchins' statement, have had a camphoraceous odour, but this was not noticeable in the material supplied to the Imperial Institute.

The thin boards were much closer grained and darker than the thick planks, and had a slightly stronger pepper-like odour.

A chemical examination showed that both kinds of wood contained only a trace of volatile oil. The quantity of oil obtained was insufficient for examination, but it was somewhat viscous, pale-yellow, slightly lemon-like in odour, not camphoraceous, and was lighter than water.

In view of these results, information was requested as to which part of the tree possessed the strongest camphoraceous odour, and it was suggested that samples of that portion should be obtained and forwarded to the Imperial Institute for examination.

Samples of the wood, branches and twigs were accordingly forwarded in February, 1909.

Mr. Hutchins had meanwhile made further investigations into the forest resources of the East Africa Protectorate (see *Report on the Forests of British East Africa*, 1909, Cd. 4723), and the "Ibean camphor" tree was found to be identical with *Ocotea usambarensis* Engl., a plant belonging to the same natural order as, and closely related to, the true camphor-tree, *Cinnamomum camphora*.

The samples received were as follows:—

(1). Six pieces of sapwood which had an aromatic odour faintly recalling that of eucalyptus oil.

(2). Branches and twigs which, when freshly broken, had a strong odour, like that of the sapwood.

(3). Branches and twigs, stated to be pollard shoots from a tree which had been cut down for some years. The material was much thicker and more difficult to cut than sample No. 2. It had the same odour when freshly cut.

The three samples were steam-distilled separately to obtain the volatile oil, and furnished the following results (p. 342); to which are added those obtained by Schmidt and Weilinger. who examined oil from the bark of this tree in 1906. (*Ber. deut. Chem. Ges.* 1906, 39, 652).

	Oil from sapwood Sample No. 1.	Oil from branches and twigs. Sample No. 2.	Oil from branches and twigs (pollard shoots) Sample No. 3.	Oil from the bark (Schmidt and Weilinger).
Yield of oil, *per cent.*	0·4	0·52	0·14	0·15
Specific gravity at 15° C/15° C ...	0·9641	0·9681	0·9327	0·913 at 20° C.
Optical rotation in 100 mm. tube ...	—7° 30'	—7° 30'	--0° 28'	--11° 12'
Saponification value.	30·1	30·1	13·3	13·7
Solubility in alcohol.	Soluble in 1·1 volumers of 80 per cent. alcohol.	As. No. 1.	Insoluble even in 10 volumes of 80 per cent. alcohol.	--

The oils obtained from samples No. 1 and No. 2 were pale-yellow and had an odour recalling that of eucalyptus oil. They were found to contain a comparatively small amount of cineol, whilst camphor could not be detected.

The oil from sample No. 3 was more mobile than the other two specimens. It was similar to them in colour and odour, but possessed a stronger eucalyptus odour, and probably contained a larger proportion of cineol, but the amount of oil obtained was too small to permit of the estimation of cineol.

In the oil from the bark Schmidt and Weilinger (*loc cit.*) found cineol, *l*-terpineol, myristic aldehyde, esters, sesquiterpene and minute amounts of a ketone and terpenes; the first two substances forming 80 per cent. of the whole oil.

CONCLUSIONS.

The results of the investigation show that the younger parts of the "Ibean camphor" tree, such as the twigs, leaves, branches and sapwood, yield small quantities of volatile oil, containing cineol. the characteristic constituent of eucalyptus oil. The quantity of oil obtained is too small to make the wood of value as a source of volatile oil, and in any case the latter would only be a poor substitute for eucalyptus oil. Its presence in the wood, however, no doubt exerts a certain antiseptic and preservative action, so that "Ibean camphor" wood should have the property of lasting well, and should be less susceptible to decay than wood free from volatile oils of this type.

From a mechanical point of view, the timber is of good quality and well suited for use for various purposes in East Africa.

It is a little unfortunate that the name "Ibean Camphor" has been adopted for this trees, since it at first gave rise to the impression that the true camphor tree had been found in East Africa (compare *Chemist and Druggist* 1907, 70. 974), and this still continues (*ibid*, 1911, 79. 18, and *Schimmel & Co., Semiannual Rep.*, October. 1911, p. 27). With a view to correcting this impression it seems worth while to place the above facts on record.—*Bulletin of the Imperial Institute.*

RUBBER.

The Rubber Production of Africa.

Though no longer generally referred to as the Dark Continent, our funds of information with regard to certain parts of Africa are still meagre, and rubber statisticians, amongst others, either fight shy of the subject of the rubber production of that Continent altogether, or content themselves with a few figures carelessly garnered and of no comparative value. The difficulty lies in the bewildering number of territories and spheres of influence into which the Continent and adjacent islands have been divided by the Powers. Figures, if they are to be had, must be collected from so many sources that the task of gathering full particulars of the rubber output appears to present even greater difficulties than it really does. As a matter of fact, nearly every Colony and Protectorate possesses a fairly efficient statistical service, but the figures for the whole of Africa, though published separately in obscure Government reports, have never been collated and made really accessible to members of the rubber trade. For one reason in particular, a more or less exact knowledge of the output of rubber from the African Continent is at present desirable. Africa furnishes, next to South America, the largest proportion of the word's rubber supply. The collection of wild rubber in the African forests is, with some notable exceptions, principally a native industry, and is not organised and financed by Europeans or persons of European descent to the same extent that it is on the Amazon. The rubber is collected under great difficulties and the collectors, year by year, are forced to go further and further afield and open up new areas. The destruction of the various rubber-producing vines and trees, if we are to believe reports, proceeds apace, and recent reforms will, it is said, have the effect of reducing the incentive to the native to undertake this particularly arduous work. The price factor is, of course, of considerable and even overshadowing importance, and if rubber quotations slip back very much further, it is probable that these anticipations will be confirmed. On the other hand, with rubber at or around its present price, it would appear that smaller outputs from one district may be off-set by increased outputs from others, and the present total of the whole Continent maintained. To some extent, how great cannot yet be estimated, the provision of modern machinery for crushing and extracting rubber from the vines may contribute to this result. How important this whole question is to those engaged in the production of plantation rubber and to the manufacturer of rubber goods, may be gathered from the fact, which we are now able to state, that the production of African rubbers amounted last year to some 22,000 tons. Obviously the reduction of this supply to, say, one-half of its present amount would, with the threatened disappearance of such low grade rubbers as the guayule, have a considerable influence on the future of the rubber industry. Such a result would be received by planters with complete equanimity, but though completely off-set by a large increase in the supply of plantation rubbers, the disappearance of a large class of African rubbers would not perhaps be equally pleasing to manufacturers.

The chief territories producing and exporting rubber are the Colonies and Protectorates of the British, the French, the Germans, and the Portuguese, and the Congo State. The French Colonies, including Madagascar, come easily first at the head of the list, and are followed by the Congo State—for the present a good second—and the Portuguese Colonies. The British and German Colonies produce a lesser amount at present. Contrary to what is perhaps the general impression, a considerably larger amount (21,462 tons, as against 19,113 tons) was exported from the above areas in 1910 as compared with 1909. Production was of course greatly stimulated by the high prices ruling for rubber. The following figures for the French Colonies have been compiled in this office from the official returus and checked and found correct by the French Minister for the Colonies, whose courtesy in this matter we here acknowledge :—

RUBBER EXPORTS FROM THE FRENCH COLONIES IN AFRICA.

	1909. Kilos.	1910. Kilos.
Senegal—		
(*a.*) Guinea	69,502	36,733
(*b.*) Niger-Soudan ...	595,045	320,408
(*c.*) Casamanca ...	352,628	352,407
(*d.*) Others	7,171	9,923
Upper Senegal and Niger ...	241,289	865,480
French Guinea	1,808,430	1,712,508
Ivory Coast	1,24,1877	1,401.269
Dahomey, etc.	699	913
Cabon	289,079	314,841
Central Congo and Oubanghi ...	1,447,217	1.344.234
Madagascar	701,570	1,125,441
Total kilos...	6,754,507	7,457,157
Total English tons (of 2,240 lbs.)...	6,647	7,340

It will be noticed that considerable increases have taken place in the exports from Madagascar, of which 17 per cent. come to the United Kingdom, and in those from the Upper Senegal and Niger. Part of the French Congo, an important rubber-producing Colony, has been ceded to Germany by the recent Treaty.

THE CONGO STATE.

The Congo State shipped in 1909 5,217 English tons of rubber; the export fell in 1910 to 5,000 English tons, the value being £2,406,837. A further drop appears to be expected, but the length at which we have recently dealt with rubber production in this State (I. R. J. November 25th and December 2nd) renders unnecessary any further reference at the moment.

THE PORTUGUESE POSSESSIONS.

The Portuguese Consul in London has kindly obtained for us figures of the exports of rubber from the Portuguese Possessions in East and West Africa. These are as follows :—

	1909. Kilos.	1910. Kilos.
From Mozambique	315,495	290,416
From Angola	2,896,806	3,270,006
Total Kilos ...	3,212,301	3,560,422
Total English tons ...	3,161	3,504

As will be seen, the exports from Angola (Portuguese West Africa) which is the principal producing region, largely increased during the past year. The value of the shipments in 1910 was: from Mozambique, 208,866 milreis; from Angola, 6,257,568 milreis. This converted into English currency at par, *i.e.*, 4'5 milreis equal £1, which would be £46,414 and £1,390,510 respectively.

THE BRITISH COLONIES.

Our next table gives the exports from the British Colonies in Africa, and it is gratifying to our national pride that while small compared with the exports from the French Colonies and the Congo State, these show as a whole the largest percentage increase in the year. Practically the whole of the output is from our possessions on the West Coast, but with the growth of plantations those on the East Coast are rapidly increasing their shipments. The figures for Somaliland and the Anglo-Egyptian Soudan are the sole items missing; but these must be small.

	1909. lbs.	1910. lbs.
Gold Coast	2,764,190	3,223,265
S. Negeria	1,388,009	2,634,023
Gambia	15,548	7,148
Sierra Leone	92,016*	57,641*
Nyassaland	27,144	59,471
Uganda	47,738*	105,909*
British East Africa ...	81,424*	177,234*
Union of South Africa ...	250	3,625
S. Rhodesia	4,689	2,004
N. W. Rhodesia	2,588	42,027
Total lbs...	4,423,596	6,312,347
Total English tons...	1,974	2,818

* Twelve months ending 30th March of year stated.

39,710 lbs. equal imported rubber re-exported *via* Livingstone Beira.

The above figures are, however, by no means a record, and were largely exceeded (for instance) in the nineties. In 1895, for example, Nigeria exported 5,377,886 lbs., the Gold Coast 4,022,385 lbs., Sierra Leone, 1,429,680 lbs., and British East Africa 104,850 lbs. Even so recently as 1906 they were largely exceeded.

The value of the exports in 1910 is placed at about £730,000.

THE GERMAN COLONIES.

The German Consulate in London has checked the following statement of the exports of rubber from the German Colonies in Africa.

The figures do not include a very small output from German South West Africa, amounting to about 25 tons in 1909.

	1909. Kilos.	1910. Kilos.
Togoland	146,786	134,919
Kamerun	1,517,635	1,961,756
German E. Africa (wild) ...	255,880	329,811
G. E. Africa (plantation) ...	228,468	413,895
Total kilos ...	2,148,769	2,840,381
Total English tons ...	2,114	2,800

Here again a considerable increase in the exports is to be noted, but, as shown, it is largely due to the increase in the outputs from cultivated plantations.

The value was returned at about £550,000 in 1909, and £898,000 in 1910.

SUMMARY.

Summarising the above figures, we find that the French Colonies, the Congo State, the Portuguese, British and German Colonies exported respectively 6,647, 5,217, 3,161, 1,947 and 2,114 tons in 1909, total 19,113 tons; in 1910 they exported 7,340, 5,000, 3,504, 2,818, and 2,800 tons, total 21,462 tons. The production of the remainder of Africa, *i. e.*, Abyssinia, Somaliland, Anglo-Egyptian Soudan, Liberia, Spanish Guinea, etc., would probably bring the figures up to 22,000 tons or thereby in 1910.—***India-Rubber Journal.***

In Nyasaland.

During 1910—11 59,471½ lbs. of rubber, of the local value £10,659, was exported, which is more than twice the quantity exported in the preceding year. This large increase is due principally to more vigorous exploitation of indigenous rubber, and in a minor degree to an increase in the output of plantation rubber. The acreage devoted to the latter has increased steadily in recent years, and in June 1911 there were 8,346 acres under rubber as compared with 5,260 acres in the previous year.

The most important development in connection with wild rubber during the past season was the exploitation by machinery of *Landolphia parvifolia* in the West Nyasa District. The rubber is contained in the cortical tissue of the underground stems, and is extracted by passing the bark through a series of rollers which alternate with water jets. Water at a temperature of 90° F. issues from the latter under strong pressure and washes the rubber free from bark. By this method a comparatively pure rubber is obtained, which is exported as crepe. The product is of superior quality, and samples examined at the Imperial Institute in January 1911 were valued at *3s. 9d.* to *4s. 4d.* per lb., with fine hard Pará quoted at *5s. 2½d.* The plant is very abundant in the West Nyasa District, and since the smaller underground stems do not repay the cost of collection, they are left in the ground after being severed from the parent plant, and rapidly form new shoots and roots. For this reason it is considered that there is no danger of exterminating this valuable species.

The only district with climatic conditions suited to the Pará rubber tree is West Nyasa, where an area of 762½ acres is at present under this species. The trees are healthy and are making good growth. The average girth measurements of trees on the Chombe Estate, taken at 3ft. from the ground, are as follows: 85 1½—year old trees, 3'27 in.; 100 2½—year old trees, 4'26 in.; 100 3½—year old trees, 8'98 in.; 102 4½—year old trees, 9'61 in. No tapping experiments on Pará rubber trees have yet been made, and tapping on a commercial scale will not commence until the trees are seven years old.

The cultivation of the Ceará rubber tree continues to be successful in districts where the soil and climate are favourable, as in West Nyasa, South-East M'lanje and a few places in the Shiré Highlands and on the Upper River. Two-and three-year old trees in M'lanje District were tapped during the season and yielded good rubber, which sold at a price only slightly inferior to "fine hard Pará." On one estate in this district the average yield from 45 trees, 9 inch and over in diameter, tapped on alternate days during a period of some weeks, was a little more than ¼ lb. of dry rubber per tapping. The Director of Agriculture assumes from these results that if tapping could be carried on for 6 months during the year, from 5 to 6 oz. of dry rubber per tree per annum could be obtained, which is considerably higher than that given in experiments conducted at Zomba and elsewhere in the previous year.

SELECTED CUTTINGS.

Bird Life in Ceylon.

HOW IT ASSISTS PLANTING INDUSTRIES.

The following is extracted from a paper read by Mr. E. E. Green at the meeting of the Passara P. A.:—

I have been asked to address you, this morning, on the subject of "Bird Life and its Effect on our Industries." This is a rather wide subject —if taken literally. But I believe that I shall meet your views by interpreting the word "Industries" as limited to the planting industries of Ceylon: and, from the report of your previous meeting, I gather that the question has arisen more particularly with regard to the presence or absence of Grevillea trees on your estates. It is certain that the more trees you have about the place, the larger will be the number of birds that will frequent the neighbourhood. It is only a few of the smallest species of birds that can find congenial cover in an area of lowgrowing tea bushes, and even these species prefer to nest in larger trees where they are less liable to disturbance. But if there is any special objection to the Grevillea tree, from the planting point of view, there are other trees that would serve the purpose of the birds and of the planter at the same time. The Dadap tree (for instance), while affording grateful shelter to bird life, and providing a rich store of nitrogenous material for the benefit of the tea, is not liable to generate the root diseases that occasionally spring from decaying Grevillea stumps. If the Dadap is unsuited to this elevation, there must be various species of Acacia that could take its place. In the "Yearbook of the United States Department of Agriculture, 1909," there is a paper on "Plants useful to Attract Birds and protect Fruit." This paper opens with the statement that "Birds play a very important part in the economy of nature, and by their destruction of insects lend material aid in keeping the balance true. Both the farmer and the orchardist are greatly indebted to birds for the destruction of insects and weed seed, and nowhere is the nature and extent of this indebtedness more fully appreciated than in the United States." Though the paper has been compiled to meet the requirements of the American Agriculturist, and many of the recommendations are impracticable in Ceylon, I may quote a few extracts that are of more general applicability:—"It should be borne in mind that smoothly trimmed hedges and the stiff trees of a formal garden are not nearly so attractive to birds as untrained bushes and tangled thickets." On the ground that most insectivorous birds refresh themselves with a certain amount of fruit and are consequently attracted by trees that produce edible fruits and berries, the writer gives a list of berry-bearing trees suitable for cultivation in America. With the exception of the Mulberry tree, this list would be of no use to us in Ceylon. But there are many wild shrubs that might be allowed to remain in ravines and waste land to attract our local birds. Lantana berries are much sought after by bulbuls, which are very useful destroyers of small insects. The Lantana plant requires no encouragement, and may perhaps be considered a troublesome weed. But we have another and equally attractive shrub that is not open to these objections. Its scientific name is Debregeasia' and it is known to the Sinhalese as "Gasdul." It flourishes naturally in every ravine and may be recognised by its narrow willow-shaped leaves (greyish beneath) and the coral-like orange berries that cluster thickly along the stalks of the plant. It is impossible to estimate even approximately the benefits that we derive, directly or indirectly, from the activities of the familiar birds of the country. It is only when through gross ignorance or mistaken ideas of economy—they have been destroyed or driven away, that their services are properly appreciated.

Much attention has been drawn to this subject, recently, in European countries. Amongst other Societies, the Brent Valley Bird Sanctuary Committee has been active in encouraging and protecting birds on the borders of London. This Society has devised various ingenious nesting boxes which are attached to the trees, to attract tits, nuthoches and other insectivorous birds. It is not only the purely insectivorous birds that are useful to us. Many birds prefer a mixed diet of fruit, seeds and insects. Such might perhaps be considered doubtful friends to the agriculturist, but it is probable that they pay well for their board and lodging by their assistance in checking insect pests. It is especially at the breeding season, when their nests are full of clamouring youngsters, that such birds turn their attention to insects. I have recently read a note describing how, in one of the European countries (Hungary, I believe) the sparrows and other small birds had been exterminated under the mistaken idea that they did more harm than good. As a result, insect pests increased to such an alarming extent that measures are now being adopted, at vast expense, to reinstate the feathered friends of the farmers. With the possible exception of the pigeon tribe, nearly all frugivorous and graminivorous birds vary their diet with insects. The case against the much-abused sparrow is still an open one. There is do doubt that the vast flocks of sparrows that abound in England do an enormous amount of harm in the harvest fields, and still more—indirectly—by their pugnacious habits which tend to drive away the more strictly insectivorous birds. The sparrow may be of great value in countries where grain crops are not cultivated, or where there may be an insufficient natural provision of more useful species. But in Ceylon, where *Passer domesticus* is an alien, and we are blessed with many insectivorous birds, its increase should be sternly discouraged. I suppose there is no country in the world to which the common sparrow has not been introduced usually unintentionally. It makes itself at home on shipping and travels freely from port to port. The date of its original appearance in Ceylon is lost in obscurity. It probably came over "with the Conqueror"—or one of them. Our local race is believed by Legge to have invaded us from the Indian Continent. Considering the number of years that it must have been with us, it does not appear to have increased so rapidly as might have been expected. Possibly beasts and birds of prey may find it more easy of capture than are the indigenous birds that have learnt the ways of their enemies by the experience of countless generations. I am inclined to think, however, that the sparrow shows signs of decided increase in parts of the Uva Province. I have noticed comparatively large flocks of them when coaching from Bandarawela to Badulla. The multiplication of a new introduction may be very slow at first, but, with an inherently dominant species, a stage may arrive when the prolificness of the species exceeds the wastage, and there is then no efficient check to its rapid increase. If this should happen in Ceylon, the sparrow might become a serious menace to rice cultivation. With this view it would be wise to check the further increase of these birds, by destroying their nests at every opportunity. I should not advise such action in the case of a truly indigenous species, however obnoxious it might appear. In matters of the distribution of fauna, nature knows her own business better than we do, and artificial interference with her methods is often followed by unexpected and disastrous consequences. The wholesale Destruction of Hawks and Owls has been known to result in a devastating plague of field mice. The introduction of new birds, however innocent they may appear to be, should not be permitted without careful consideration by experts, and should certainly not be left to the caprice of the individual, A notable instance of mistaken action of this nature occurred in the Seychelles within comparatively recent years. At one time rice and grain of various kinds—sufficient to support the population—were grown in the islands. Birds, especially pretty birds, were somewhat scarce, so some aesthetically-inclined individual thought that he was conferring a benefit upon the community by importing and liberating a small flock of "Cardinal finches" from Madagascar. This beautiful flame-coloured bird flourished exceedingly in its new home and increased enormously in numbers. Being exclusively a grain feeder, it soon worked such havoc that, for many years, the cultivation of rice has been completely abandoned. Formerly, the islands were self-supporting in the matter of rice. Now, every bushel of rice that is consumed in the place has to be imported. To return to the beneficial birds, fresh knowledge of insectivorous habits is constantly being accumulated. The British Grouse, at one time believed to feed exclusively upon heather, is now known to consume enormous numbers of insects during the summer months. Young grouse are said to live almost entirely upon insect food. Even the smaller hawks and owls are large consumers of insects, especially of beetles and caterpillars. In Ceylon, every bird that flies takes toll of the winged termites which appear, at times, in such prodigious numbers. Kestrels have been observed catching the large cock-chafers whose larvae are sometimes so destructive to the roots of plants. When investigating an outbreak of the "Spotted Locust" an animal that, from it brilliant colouring and evil smell might be expected to be most nauseous, and certainly avoided by most birds. I was informed by a careful observer that numbers of a large hawk (species undetermined) appeared at the time of the swarms and fed upon the locusts. Kingfishers also vary their diet with beetles of many kinds. The thrush tribe, though sometimes condemned for their partiality to fruit, pay for their dessert by their incessant war against slugs and snails. Cuckoos and their cousins the "Coucals" (of which our "Jungle" or "Pheasant Crow" is a familiar example) devour large numbers of caterpillars as a set-off against their nest-robbing habits. I can remember shooting a cuckoo, in the days when Ceylon was rejoicing in the cinchona boom, and finding its stomach packed with the huge green caterpillars of the "cinchona hawk moth." The Ceylon Crow has, on more than one occasion, proved a blessing to tea planters in the Kelani Valley districts. When "Nettle Grub" was ravaging these estates, daily flights of crows used to arrive each morning, from Colombo, to gorge upon the caterpillars. I have been told that many of them became so replete that they could scarcely fly.

DESTRUCTION OF CATTLE IN INDIA.

An outcome of the military establishment in India, as unnecessary as it is unfortunate, is the wholesale slaughter of Indian cattle for good purposes. This promises to denude India of her best cattle unless the Government interferes. The present position is so acute that three distinguished Indian representatives are now petitioning the English Parliament for legal protection against further destruction of Indian buffaloes and cows. These petitioners are K. S. Jassawalla (a Parsee), M. C. Patel (Hindu), and Ali Mahommed Bhinja (Mohammedan), who are now in London to present their petition in person to Parliament. It is stated that over 150,000 cows and buffaloes are annually killed to provide meat for British troops in the East, and the protest against such slaughter bears no fewer than 2,000,000 signatures. The area in Australia suitable for cattle-raising far exceeds the pastoral area of India, and it is suggested that Australia shall meet the cattle demand for which hitherto Indian animals have been killed. This proposal indicates that the caste prejudice, which prevents so many inhabitants of India from eating beef, also stands between them and a profitable industry.—*United Empire.*

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New York Rubber Exposition.

On his way back to India Mr. J. A. Richardson wrote to the Secretary:—

"I have just received a letter from Mr. Staines Manders with reference to the New York Rubber Exposition, a copy of which I understand he has sent you. When in London last week I discussed matters with Mr. Manders, and he informed me that it was proposed to accept samples of produce of all kinds as well as rubber. In these circumstances it may be possible to raise the sum of £250 to £300 proposed by Mr. Manders, as this spread over the whole planting area of South India including coffee, tea, rubber and cardamoms, would come to a very small cess per acre.

"I think we might get considerable help from the Coast firms who deal in fibre, copra, and cocoanut oil. . . .

"Ceylon, the Straits and the Dutch Government are sending considerable exhibits, and I hope Southern India will see its way to be represented.

"If the matter had been confined to rubber alone there might have been some difficulty in raising the required funds but with all other products included I hope an effort will be made to do something. As you will see from Mr. Mander's letter we must give him an answer one way or the other as soon as possible."

Mr. Manders' letter, referred to in the above, reads as follows:—

"I beg to confirm the conversation I had with you on Friday last, *viz.*

"That, whatever amount you arrange for space and stand I will use to the very best advantage in the interests of your country.

"For the sum of from £250 to £300 I will be able to arrange for a nice space and stand, and if a larger sum can be provided, the space will be larger and the stand better, but you may rely upon my spending the money only in such a way as to provide the best possible representation of South India.

"At a Meeting recently held in New York it was decided, on the application of some of the Governments, that other products of the soil grown in rubber producing countries, could be exhibited. This gives an excellent opportunity for showing, for the benefit of trade and commerce, everything that can be produced in Sonth India.

"I trust there will be no difficulty in securing the money required, and I must say that whatever sum is allotted will include all charges, (with the exception of freight and cartage to the building) such as space, stand, unpacking, arranging exhibits, supplying man to dust and cover up, and re-packing at the close; or exhibits will be sold at the close on your account, or you may appoint anyone in business in New York to take over the goods.

" It is advisable that printed matter should be distributed, and this I can get printed in the States if you let me have particulars early.

" All exhibits should be carefully labelled with tags giving name and address of exhibitor, name and adcress of Agent in New York; name and address of London Agent if any, so that enquirers may be able to communicate with the Exhibitor or his Agents.

" I know of a gentleman going over who is thoroughly conversant with Rubber and Tropical products, and with South India. He will be representing two or three other Exhibitors so if you wished to have a special Representative to give general information regarding your country he would do it for you for a fee of £25 (twenty five pounds). He is a good speaker and of good appearance. This of course is not obligatory on your part; I only throw out this suggestion in case you want a good man. At the same time I will do anything I can for South India.

" I should esteem it a favour if you could cable me . . . as early as possible."

The following Notices relating to the Exposition have been received from London :—

MEDALS.

" At a special Meeting of the Rubber Growers' Association, held at the London Chamber of Commerce, it was resolved to present to the New York Rubber Exposition, which opens in September next, a series of Gold, Silver and Bronze Medals for free Competition open to all the Rubber Plantation countries in the world exhibiting at the Exposition.

" The condition of the Competition is that at least 1 cwt. of Rubber, to be a Commercial, not and Exhibition sample, must be shown for each entry made, and Planters are to have the privilege of making more than one entry if they wish.

" The Competition is to be judged by seven of the leading Rubber Manufacturers of America.

" Entries for the Competition close on the 1st August and are to be made direct to Mr. A. Staines Manders, c/o the Grand Central Palace, 46th to 47th Streets, Lexington Avenue, New York City."

£1,500 FOR INVENTORS.

" At the New York Rubber Exposition, which opens in that city in September next, the conditions will be published in reference to prizes to the value of £1,500 to be offered by the London 1914 Rubber Exposition. This amount is to be divided into three prizes and is to go to the Inventors who can suggest a method of making Rubber non-slipping for outside use, as pavement, roadway, and wherever Rubber is exposed to all atmospheres and to heavy traffic.

" No claim will be made on the Inventors by the Exposition authorities for any rights or controlling interest in the invention. The prizes will be awarded free of any restrictions, thus while the inventors receive the awards, their patents or inventions will be their own property. "

One planter who desires to exhibit wishes to be placed in communication with others who are of the same mind, with a view to the economy that can be effected by joint shipments and co-operation. Intending exhibitors are invited to send in their names to the U. P. A. S. I. office.

Scientific Officer's Papers.

XCII.—AN ADDRESS DELIVERED AT THE ANNUAL GENERAL MEETING OF THE NORTH MYSORE PLANTERS' ASSOCIATION HELD AT BALEHONNUR ON 22ND FEBRUARY, 1912.

It gives me much pleasure to be able to attend the Annual General Meeting of this Association, and as this is the last time I shall have the pleasure of addressing you before I hand over the sort of work I have been doing for you to your Assistant, it may be of interest if I briefly review the situation.

During the three years I have been here, (it is nearly three years now) I have been able to do little but sort out the different problems to be solved. If I have been able to give a hint here or advice there as to how small matters might be immediately improved so much the better, but I have felt all along that my work lay along lines of organisation. That I was justified in this view is shown, I think, by the foundation of a Scientific Department, and the advent of a staff.

The question we shall shortly have to consider is what we will do with our Assistant when we get him. Let us see what the problems of this District are.

First, there is the old stager "Quality and Curing." This is intimately connected with the breeding of new types, that is, the Hybridisation of Coffee. How far the Assistant will be able to study the Curing question I do not know, but I hope he will be able to take up the hybridisation work with the Hon'ble Mr. Hamilton. The Experiment Plot which has been given us in the Nilgiris on which to carry out the study of coffee hybridisation has been cleared, nurseries are being made, and work has begun. It will no doubt be several years before any results can be hoped for, but it is at least something to have begun work.

Next there are the Manurial problems, and these I consider of great importance. I feel sure that it can be demonstrated that money is being wasted on manures; the wrong kinds and the wrong quantities are being applied. The manurial value of the mulch is too often neglected, and I am not at all sure that Coffee needs the big doses of Nitrogen that are now given to it. An experiment has already been begun in South Mysore to test this point, and Mr. C. K. Pittock is co-operating with me in it.

Rational systems of manuring, the conservation of natural sources of manure, the use of Composts and Green Dressings, all these are points which I now hope to see worked out.

The use of Lime, and the possibility of finding cheaper sources of it than exist at present is another matter for investigation. Here again a start has been made. I have almost completed a survey of lime-stone deposits from different districts. Most of them are distinctly disappointing and consist of low grade Magnesium stone unsuited for agricultural purposes. A few are more promising, and I still hope that something may be done. A little *co-operation* will be needed to do the burning and distributing. A couple of samples from the neighbourhood of Lingadulli are quite suitable, one of them containing 85·5% of Limestone and less than 1% of Magnesia.

Turning now to diseases; *Leaf disease*, I fear, cannot be done much for. An alkaline condition of soil and plenty of humus appear to check it, and the most profitable line of study would be I think to determine the relation of the disease to soil acidity. *Black Rot* is an untouched problem. I suggested a few preliminary experiments for dealing with it two years ago but I believe no one took them up, for want of the 'elbow jogging' which Mr. Danvers talks about and which the Assistant will supply. When I was at Pusa in December and was talking to Dr. Butler about this disease he told me he wanted to study it, but had never been able to get material showing all the stages. I promised that he should be supplied with it this year and I hope we shall have the benefit of his investigations. *Root Rot* and *Stump Rot* have received a good deal of attention during the last two years, and I have no new lines of research to suggest at present.

It would appear that preventative methods should be adopted and since the disease begins on dead stumps of certain trees, these should be removed whenever possible, and when too big for removal they should be isolated by means of a surrounding trench at least three feet deep which should be kept open until the stump has rotted away.

When the disease has attacked the Coffee badly so as to kill out big patches of it, the method which has given the greatest measure of success is to fell and dig up all trees on the patch including the shade, to trench the soil as deeply as possible, removing and burning all roots, to apply a heavy dressing of Lime and after leaving the soil thus treated exposed to the sun during the hot weather to replant it with Coffee and shade trees, using *Erythrina* as a temporary shade.

Some gentlemen present will tell you that they have been successful in stumping the Coffee in such patches and then treating it as above without having to remove it all.

The experimental treatment I suggested two years ago with Sulphate of Iron appears to be a failure and better results are obtained with Lime.

These are the main points to be worked at in Coffee, I think. The Rubber problems chiefly concern the Ceará variety. Here a lot of good work has been done in Coorg and an attempt to duplicate the results obtained there should be made. A tapping system in which a separate cut is made each time has proved the best. What is really wanted, however, is reliable figures of Ceará yield. A few hundred trees of about the same size should be tapped steadily throughout the whole of a tapping season, by some system which should be unvaried throughout. It would then be possible to determine what can be got out of the tree and the cost of production, and this would be a starting point for any methods of improvement. Until such figures are known it is groping in the dark to experiment with manures and knives and tapping systems. This then appears to me to be the starting point for the study of Ceará.

This is briefly the situation as the Mysore Scientific Assistant will find it; and I confidently look forward to the results of his work, and feel sure that this Association will very soon begin to reap the benefit of their belief in the use of 'Science in Agriculture.' And since there is still here and there a misunderstanding as to what Science is, I will conclude by quoting an illuminating passage which appeared in a recent number of the *Tropical Agriculturalist.*

"Huxley, in one of his apt phrases, described science as 'trained common sense.' The real meaning of science is knowledge, and surely no one will deny the practical usefulness of knowledge. Science is, however, something more than ordinary every-day knowledge. It is knowledge obtained by thorough and exhaustive examination of many facts, by patient well-planned accurate experiments, and by unprejudiced logical thinking as to the meaning of the facts thus brought to light. Its methods are those of common sense improved by training, discipline, and exercise. Science is not the exclusive property of the professional scientist, but is the common heritage of all men, and is free to every one who will enter it with open mind, industrious work, and honest thought. There are men in all ranks who are born with the scientific cast of mind, and the practical farmer, the man in business, the journalist, the legislator, and so on, may be men of scientific method and habit of thought. The more scientific men are in all walks of life, the more practical they are, and the less given to be guided by prejudice and imperfect knowledge.

"The scientific directing of a country's agriculture means then the guiding of that agriculture according to knowledge and the dictates of common sense."

RUDOLPH D. ANSTEAD,
Planting Expert.

Co-operative Coffee-curing Works.

A SECOND ADDRESS DELIVERED AT THE SAME MEETING.

Mr. Anstead also delivered the following address on the above subject:--

Conservatism is a typical characteristic of the Indian Planter, and indeed of the planter all the world over. He is right to be conservative until he has been convinced that there are better ways and methods, better means, and larger results to be obtained than those obtained by the means and methods which he has employed in the past, However, the time has arrived, at least in North Mysore, when it should be recognised that some of the old methods are capable of improvement.

In our youthful days we most of us laboriously copied from time to time in large round hand and exemplary pot hooks the maxim: 'In unity there is strength,' and perhaps it is on account of our early familiarity with the phrase that its truth needs to be emphasized now-a-days. At present there is little unity, or co-operation, or organisation of any sort amongst Indian planters, and that 'planters won't combine,' appears to be accepted as a platitude. Yet the good results possible from intelligent organization can scarcely be overestimated.

I am glad to see that the North Mysore Planters' Association have officially recognised this and are once more to the front in the initiation of a progressive measure.

The establishment of a co-operative Coffee Curing Works appears to me to be such an obvious advantage that I cannot understand why it has not been done before.

Not only will such works bring material saving and benefit to the Coffee planter, a side of the question with which many present are more skilled to deal than I am, but from the Scientific side they will be a boon. The Mysore Scientific Assistant will take up the study of quality and curing of coffee, and the production of hybrids, and if he has access to curing works belonging to planters themselves it is obvious that he will have facilities for study such as he could not have at works belonging to a private firm.

But I look upon Curing Works as merely the beginning of a co-operative scheme, it should rapidly grow from this into an affair which covers practically all that the planter buys or sells.

Let us look for a moment at what has been done in other countries. In the Consul's report on Canadian Co-operative Fruit Associations it is stated that in Ontario the central association arranges for the purchase of supplies for all the different Fruit growers' associations. "The saving in this way is immense," says the report, "as carload lots of chemicals can be bought at a time of year when prices are at their lowest and held until wanted for use. Each Society is asked to send to the Head Office an estimate of the amount of supplies required which serves as a guide in buying. Other supplies, such as packages and spray machinery, are bought in the same way and a great saving has been effected. Buying co-operatively has made it almost impossible for a combine of manufacturers to control prices as was attempted with fruit packages a few years ago. The makers of baskets from whom the St. Catherine's Society had been buying put the prices of baskets so high that the society determined to place their order in the United States. Their order was very large and the prices so favourable in the United States that they have since been able to make very favourable terms with Canadian concerns.'

In Denmark, the co-operative system has been developed more than in any other country. In a recent report upon their system it is stated that, "The system of co-operation as practised in Denmark may be said to be an adaptation of the English Rochdale system. The first step was the foundation of a co-operative supply stores about the middle of last century and this was followed in 1882 by the first co-operative dairy. The movement has now developed so far that there is not a single matter of interest to the farmers that has not become the object of co-operation. The motto of co-operation in Denmark may be said to be, 'Each for all and all for each.' This applies both to the liability incurred in raising the loan necessary to commence the undertaking, whatever it may be, and to the division of the profits of the undertaking."

That is the sort of thing we need among coffee planters in Southern India.

'Co-operation should go even further than this and might do so in a very simple and practical way. Mr. Lefroy, the Imperial Entomologist, in a 'Note on Agricultural Entomology in Madras' said, "the major pests of staple crops are those with which we are most concerned; nothing can be done against them except by co-operation on a large scale, and the attention of District Officers is required to ensure that what is done shall be done by all; these pests affect not one man alone but groups of villages, or the whole taluk or district, and it is against them that the greatest efforts will be necessary."

Under this category come pests like Coffee Borer and Scale Insects. It is of little use for some individuals to attack these pests while others do nothing. The areas cleared of the pest are reinfected from the untreated areas. Where pests of this nature concern both the European planter and the Indian planter or the ryot who does not belong to the District Planters' Association the attention of the newly appointed Madras Entomologist and of the Mysore Entomologist might be called with the object of inducing these men to co-operate with the European planters in stamping out a common enemy.

But before we approach these gentlemen we must be sure that the beam is cast out of our own eye, we must have solid co-operation amongst ourselves.

I suppose every one here cuts out Borer, but does every one here systematically attack scale insects ? Let us decide upon a policy of attack and adopt it generally, and then we can ask the Government Scientific Officers to see to it that others do their share.

The practical difficulties of establishing a Co-operative Coffee Curing Works must be small; of these you are more qualified to judge than I am. I would offer one piece of advice only—place the management in the hands of a good business man and pay him well enough to keep him at this work and this only.

I have had occasion before, when they initiated a Scientific Department, to congratulate this Association on being progressive. If the Association is now about to take a step along the path of co-operation that is a matter for further congratulation.

DISTRICT PLANTERS' ASSOCIATIONS.

North Mysore Planters' Association.

Annual General Meeting Proceedings, 22nd February, 1912.

PRESENT.—Messrs. C. P. Reed (President), C. Danvers, E. C. Kent, F. I. Morgan, H. Pilkington, C. H. Browne, H. G. Bonner, E. C. Bolton, C. S. Crawford, W. H. Reed, Thos. Hunt, E. W. Fowke, R. G. Foster, C. H. Trevor-Roper, A. F. Evetts (Honorary Secretary), R. D. Anstead (Honorary Member). *By Proxy*: F. J. Parton, S. L. Mathias, H. M. Northey, D. Mathias, A. Durham.

Honorary Secretary's Report and Accounts.—The Honorary Secretary read his report as follows:—

Gentlemen,—Since my last report on the financial position of our Association the B. P. A. has been formed. This has resulted in 12 estates seceding, representing 3.500 acres and Rs.245-10-0 in assessment. The total acreage on the rolls of the Association during 1911 was, therefore, 11,120 acres, the assessment being Rs.1,032-10-6. Of this sum I had collected Rs.991-10-6 at the time of making up the accounts, during the last day or two though I have received Rs.29, so the amount in arrears is only Rs.12 due by Buskull. I have made every endeavour to get in subscriptions, it was my ambition to be able to tell you there was a clean sheet again but I have been disappointed. The guaranteed Sc. O. Fund shows two subscriptions to be still due, but in this case too I have received one of them since making up the accounts, the estate mentioned above is again the one in arrears. One subscription to the P. B. Fund is still due also.

The result of the year's work you will gather in detail from the printed sheet of accounts. The total income amounts to Rs.1,857-0-6 (including the guaranteed Sc. O. Fund and interest on the fixed deposit) and disbursements to Rs.1,710-7-4, the surplus is therefore Rs.146-9-2. Out of this expenditure practically Rs.1,300 has been paid to the U.P.A., the remainder, Rs.411-3-4, represents the cost of running the Association, including delegates, and works out to a charge of only 7 pies per acre.

With reference to the Balance Sheet all I have to point out is that I have had to borrow Rs.875 from the Bank, the fixed deposit receipt being held by it as security, to meet the call made by the U. P. A. for one quarter of our guaranteed subscription for providing an Assistant Scientific Officer. Bar this loan, which I think can be paid off out of subscriptions for 1912, the total assets of the Association stand at Rs.4,244-12-2 not counting the interest, about Rs.157, due us in four weeks time on the fixed deposit.

With reference to the current. Since January 1st the following estates —Gooboor, Ardoch, Kercassia and Bupponji—have resigned on account of the 8 annas cess whilst Kelguny has joined; the net result is that our acreage sinks to 10,400 acres. I have heard rumours of further resignations on the above account but I trust they are baseless. For this reason, however, I have worked out the financial position on the 8 annas basis should the acreage fall to 10,000, 9,000 or even 8,000 acres.

In the case of 10,000 acres the subscriptions to the U. P. A. will be as follows:—

Assistant Scientific Officer	3,500	0	0
Scientific Officer guaranteed Fund... ...	568	0	0
Laboratory up-keep	104	2	6
Experimental Plot	100	0	0
U. P. A. Annual Subscription	416	10	0
Total Rs...	4,688	12	6
This Association's up-keep about	409	3	6
Total Rs...	5,098	0	0

against an income of Rs.5,000, which will leave an adverse balance of Rs.98.

In the case of 9,000 acres and 8,000 acres, the reduction in U. P. A. Annual and Laboratory Up-keep subscriptions having been taken into consideration, the adverse balance will be Rs.521 and Rs.945 respectively.

Against these balances there will be a small set off in the shape of interest on the fixed deposit, also if we can get a grant of Rs.1,000 from the Mysore Government we shall, I take it, benefit to the extent of Rs.500, as the B. P. A. and S. M. P. A. together only contribute Rs.40 more than we do to the Assistant Scientific Officer.

On the whole, however, I don't think we need be alarmed at the position, as even in the worst case we shall be able to see our Scientific aid scheme through, although at the end of 5 years we may be without any reserve fund.

In conclusion, gentlemen, I have one suggestion for your consideration and that is to alter the dates of our financial year so as to coincide with those of the U. P. A. Such a change would considerably facilitate the duties of your Honorary Secretary, and our Annual General Meeting could be held in September of each year more or less directly after the U. P. A. meeting, important questions arising thereat would then receive immediate attention at an Annual General rather than a small Quarterly meeting. I have to thank members for the courtesy shown me in all correspondence, etc.

In laying the accounts before you for audit and inspection I beg to submit my resignation of the Honorary Secretaryship and trust my successor will find no difficulty in taking up the duties at the present juncture.

(Signed) A. F. EVETTS,
Honorary Secretary.

The accounts were laid on the table and audited by Messrs. Thos. Hunt & Foster and found correct.

President's Address.—The President addressed the meeting as follows:—

Gentlemen.—Owing to the rise in prices, I hope we meet again once more with lighter hearts and heavier purses and that the depressing days when we talked about the friendly bullet and the silent tomb are a thing of the past. With few exceptions, good crops seem to have been a feature of the season and prospects for next are fair.

Since meeting here a year ago, Mr. Browne's scheme of obtaining the services of an Assistant to Mr. Anstead for Mysore, and raising our paltry subscriptions to 8 annas an acre has been accomplished. For the sake of unity (or the first word of our parent Association's name) let us hope the few who may still have any personal difference of opinion in the matter, will generously give way to the majority who look to great things being accomplished by our Planting Doctor and his Mysore Assistant, who is to arrive in May. The question of a suitable central residence for Mr. Frattini has yet to be settled.

We have had to borrow money from the Bank against the fixed deposit account to pay our share towards the money required to get our Scientific Assistant out from England. It is to be hoped that members will endeavour to promptly send in their subscriptions when asked to do so, to enable the executive to make quarterly payments to the U. P. A. S. I. on account of our planting experts, instead of having to draw against the deposit account.

It is for you to decide whether it would not be advisable to call in subscriptions half yearly or yearly in advance.

The chief item on the agenda to discuss and settle to-day is the "Labour Question"—The Labour Difficulties Committee appointed to discuss the matter, held a meeting on the 22nd of November last and it came to the conclusion that labour was short throughout the district owing to outside competition.

A circular with a few suggestions which might alleviate the difficulty has been sent to you for consideration. A few suggested labour rules sent in by members, were also put forward in the same circular. You have also been furnished with a copy of the labour rules in Travancore, which seem to work fairly satisfactorily. The question of inter-estate labour Crimping is one in which we can easily help ourselves if all members will conscientiously stick to a few rules—more as a preventive measure than a remedy against crimping. You have all doubtless read the articles appearing in the *Madras Mail* lately with reference to Ceylon Planters' Politics, and no doubt the more foresighted of you realize that there are 'Rocks ahead.' It behoves us to be on our guard and take such steps as may be necessary to mitigate the risk of losing our labour. To use a well known adage, 'It's no use shutting the stable door after the horse has been stolen.' There are doubtless some of us who do not feel the pinch for labour at present, and whose recruiting grounds have not been tampered with by recruiters from the South, but the day may come, and that very soon, when even their pet Tom Tidler's grounds may be invaded and they too will feel the pinch for labour.

The Honorary Secretary has made a suggestion that the dates of the financial year of this Association, which at present runs from January to December, be altered to coincide with that of the U. P. A. S. I. It would be as well to give this proposal your earliest attention, as it will doubtless make things easier.

Gentlemen,—I now tender my resignation.

(Signed) C. P. REED.

Election of Office Bearers.—The following were elected for 1912: Messrs. Thos. Hunt, President; H. G. Bonner, Vice-President; W. H. Reed, Honorary Secretary.

Resolved: "That Subscriptions be called every 6 months and that the alteration of the financial year be left over till next meeting."

Mr. Anstead addressed the meeting (*Vide* Scientific Officer's Paper, XCII, p. 159).

Labour Difficulties.—After some discussion Mr. C. H. Bonner proposed, seconded by Mr. C. S. Crawford: "That labour in the district is so short that it is desirable to increase the rates of pay."

Mr. E. C. Bolton then proposed the following amendment "That the supply of labour at present is not so short as to justify us in raising rates generally for some time to come." The amendment was lost—37 votes against 24 for. Mr. Browne's proposition was then put to the meeting and carried by 39 votes for and 26 against.

After some discussion it was decided to pay a Bonus of 8, 6 and 4 annas respectively to men, women and children working 24 days or more during the month.

Labour Rules postponed for discussion *sine die.*

Co-operative Coffee-curing Works.—Mr. Anstead addressed the meeting, (*vide* p. 161).

After some discussion it was resolved: "That a committee be formed to make inquiries and draft a practical scheme for the formation of a Co-operative curing works." Messrs. Browne, Pilkington and Evetts were elected to serve on the Committee.

Chickmagalur-Kadur Railway.—The general feeling of the meeting was against the proposed railway.

Council of Mysore Planters' Associations.—Read letter from Honorary Secretary, Bababudin Planters' Association. Resolved: "That this meeting is of opinion that to form the above council, 3 members would be sufficient from each Association and the voting should be on the subscription basis."

Kalasa Coffee Stealing Case.—Postponed to next meeting.

Mr. Danvers proposed a vote of thanks to Mr. Anstead for his most interesting address. Carried with acclamation.

After a vote of thanks had been passed to Messrs. Reed and Evetts for their services during the past 2 years, the meeting came to an end.

(Signed) W. H. REED,
Hon. Secretary.

Uganda has not only entered the field as a serious competitor of the great coffee-growing countries, such as Brazil, S. India, Java, etc., but bids fair to rival, if not excel them in point of quantity and quality of production. Coffee in Uganda has given the most extraordinary results. Some years ago the White Fathers' Catholic Mission at Kampala inaugurated the cultivation of coffee Arabica from seed obtained from Nyasaland, known locally in East Africa as Nyasaland coffee. To-day, crops up to 16 cwts. of this variety have been picked off one acre, and 10 cwts. per acre is considered quite a reasonable estimate from virgin land. By way of comparison one may recall that in the old coffee days in Ceylon 6 tc 7 cwt. per acre was considered quite a bumper crop. . . . It has been estimated by planters that in the Mabira Forest an acre in full bearing will yield 16 cwts. of husked coffee which can be marketted at a cost of £1 per cwt. This leaves, at the present price of around 70s. per ewt., a profit of 50s. per cwt. or a net yield of £40 per acre. Cut this in half, and you still have £20 per acre profit. Not bad for coffee, and not very far short of the croesus-like returns, which have come to be looked upon as the natural result by those interested in rubber plantations.—*The Rubber World.*

CORRESPONDENCE.

Fund for the Improvement of European Schools in India.

AN APPEAL.

Dear Sir,—It is probably within the knowledge of your readers that the Managers of European Schools in India of the Church of England, the Church of Scotland, and all the Evangelical Free Churches. with the sanction and co-operation of the representatives of these Churches both in this country and in Great Britain, united last year in an effort, which will be maintained during the present year, to raise a Fund of £250,000 for the improvement of their schools. Towards this amount more than £96,000 has already been subscribed.

THE DISABILITIES OF THE DOMICILED COMMUNITY.

In India, where elementary education is neither free nor compulsory and secondary education is not assisted as liberally as at Home by endowments, scholarships, and grants from public funds, the income of European Schools, largely dependent on fees, is insufficient to enable them to reach a proper standard of efficiency. European and Anglo-Indian parents have to pay fees for the education of their children in elementary schools, from which parents in Great Britain are exempt. Parents living in outlying districts, in which there are no schools or only elementary schools, as well as many parents in large centres of population, find it necessary to incur the expense of sending their children to boarding schools. Many children of school-going age, whose parents cannot afford to pay fees, are not attending any school.

For these reasons it was the original intention of the Committee of the Fund not to appeal for contributions in this country.

THE APPEAL OF THE DOMICILED COMMUNITY.

But the self-respect of the Domiciled Community has led many of its members, in spite of their disabilities, to represent to the British Council of the Fund that they wish to have an opportunity of taking a direct share in the special united effort on behalf of their children which is now being made. One who wishes to be anonymous for the present at least has offered a lakh of rupees, on condition that an Indian section of the Fund is opened, and that four lakhs more are contributed to it within a year.

THE APPEAL TO THE DOMICILED COMMUNITY.

We therefore beg you to aid us in giving publicity to the fact that an Indian section of the Fund has been opened, and to allow us to appeal, through your columns. for generous donations to it from Europeans and Anglo-Indians, in order that the condition may be fulfilled which will entitle the Committee to the lakh of rupees which has been offered.

We are anxious to make it known that we shall welcome the smallest donations, for we hope that these will, by their number, testify at Home to the willingness of the entire Community to do all that it can for the education of its children.

DONATIONS TO THE FUND.

In addition to the conditional offer of a lakh of rupees for the Indian section of the Fund, a donation of Rs.3,000 from a Calcutta mercantile firm has been received; and the following donations, from firms and individuals having interests in India have been received in England:—

> Anon, £5,000; Anon, £1,500; Sir Daniel Hamilton, £500; Messrs. Ralli Bros., £500; Messrs. Whiteaway, Laidlaw & Co., £500; a General's Widow Rs.5.000; Burma Oil Co., £250; Messrs. James Finlay & Co., £250; S. R. £250: Messrs. Octavius Steel & Co., £200; Messrs. Walter Duncan & Co.. £150; T. C. Lewis, Esq., £100; D. Mackinnon, Esq., £100; Messrs. Macmillan & Co., £100.

ENDORSEMENT OF THE SCHEME.

His Majesty the King-Emperor "trusted that the necessary funds will be forthcoming for the accomplishment of this comprehensive and beneficent scheme;" and, in a letter to the London *Times*, the Archibishops of Canterbury and York, the Moderators of the Church of Scotland and the United Free Church of Scotland, the President of the Evangelical Free Church Council of England and Wales, Lord Lansdowne, Lord Elgin, Lord Curzon, Lord Minto, Lord Roberts and Sir Andrew Fraser, all of whom are members of the British National Council of the Fund, "heartily and unreservedly commend the cause on the grounds of common humanity, of religious duty and of political expediency."

On the same grounds we issue this appeal and commend it to the generous consideration of all who have at heart the highest interests of "the Domiciled Community."

Donations will be gratefully received and acknowledged by the Honorary Treasurer, 134, Corporation Street, Calcutta, or to Mrs. Henderson, The Museum, Madras.

W. H. ARDEN WOOD,
Hon. Joint Secretary and Treasurer of
the All-India Committee of the Fund.

26th Feb. 1902.

ALEX. FRANCIS,
Hon. Joint Secretary of the British National
Council and the All-India Committee of the Fund.

COFFEE IN GUATEMALA.

The coffee crop of 1910-11 amounted approximately to 720,000 quintals of clean coffee, which was somewhat lower than the forecast, and the present season (1911-12) is expected to yield an almost equal amount, earlier predictions having been contradicted by the unusual weather conditions that prevailed over the Republic just previous to the first pickings. Heavy rains in the Coban district seriously affected the output of Alta Verapaz coffee.

COFFEE.

Valorization.

The circular issued by the Valorization Committee has now been fully considered, and the conclusion is, generally speaking, that lower prices cannot yet be expected. This again is strengthened by the opinion that the monthly figures when published will not be favourable. The Brazilian receipts have shown a very decided falling off, and the deliveries are believed to have been good recently. Further, it is evident—and particularly is this the case with the home trade—that dealers are holding small stocks, and are all anxious to buy when the lowest price is touched. This of necessity leads to continuous small purchases, and thus a steady demand stops any chance of a decline. The whole position doubtless depends upon the outturn of the next Brazilian crop, and should it prove so small as the estimates speak of, a further advance must be expected. Unfortunately there is no means of checking these estimates, but the figure given is so small that it would be dangerous to rely upon it. The latest report from Costa Rica intimates that the crop will not be so large as was expected, and some of the best marks are said to have had a particularly small outturn. No arrivals of East India have been reported, but the next fortnight or so should bring some.—*Produce Markets' Review*, February 3.

The Hamburg Correspondent of the *Economist*, writing on January 31, said:—

Last Thursday the Valorisation Committee published its statement of policy as regards the sale of its holdings during the current year. . . . That the trade was pleased with the announcement cannot be pretended. It was pointed out, for instance, that the disposal beforehand, probably some time ago, of 400,000 bags at New York was not in agreement with the promises of the syndicate, and the statement that the committee had a firm offer of 83f. basis good average Havre for the European 300,000 bags was interpreted as meaning that inside friends of the committee had taken the coffee on certain terms which would protect them from any loss, whatever the general market may do. However, it meant the removal of an uncertainty which had troubled the trade for some time, and was greeted with a sharp rise of 1 to 1½ pf. This has been lost and regained several times since, but, on the whole, increased firmness has predominated, and the close to-day is firm. . . . The demand for spot coffee has been a little more active, but business is still restricted, as buyers wish to wait until February 12th, on which day the 300,000 bags are to be allotted, to see what supplies are coming out, as you know the Hamburg and Bremen stock will furnish 100,000 bags. The decision to ship 200,000 bags from Antwerp to New York is regarded as in favour of holders, as it relieves the heavy Antwerp stock to that extent. What the trade is practically puzzled at is the statement by the committee that all its Santos coffee at New York had been disposed of, for according to the accepted statistics, New York had in April last year 709,690 bags of Santos valorisation coffee in reserve, and nothing was to have been sold until now. The question is pertinently asked: What has become of the 300,000 bags which apparently have disappeared without notice? The Valorization Committee is called upon to explain, but probably will not heed the request. For the present the disposition is to look for a fresh upward movement, for which the impulse is presumed to come from Santos itself. Considerable shipments have been made from there this month, and relieved the congestion. Receipts are now becoming light, and the Brazilians will be helped by probably more liberal consumptive distribution.

RUBBER.

Forward Contracts for Plantation Rubber.

The attempt to standardise plantation rubber by including first grade crepe and sheet in the term "first quality latex" has been quite a success, in so far that it has facilitated business in plantation futures. Forward contracts made in past years have generally been open to criticism, mainly because the sales were based on specified samples. Even to-day some contracts are made on samples submitted, but only when an estate turns out a special quality of crepe, smoked sheet or block which cannot be confused with similar grades from other plantations. Samples, like prices, are apt to change; estate managers cannot always turn out twin rubber in point of colour, thickness, surface and size every month in the year, hence the difficulty of strictly carrying out the terms of contracts made on samples only.

In the future it is very probable that sellers will insist on the option of delivering rubber to meet forward contracts in the form of (1) crepe, (2) smoked sheet, (3) unsmoked sheet. At the moment there is a very keen demand for good thick crepe, unsmoked. It must not be assumed that this means inferiority of all other forms of plantation rubber; it is the demand of the moment and must only be regarded as such.

Planters would, we imagine, be only too pleased to supply crepe in preference to smoked sheet, and proprietors too would be anxious to meet such a demand if only on account of the saving of expenditure necessarily incurred in smoking rubber. If we are to accept the assurances of many manufacturers, crepe is not the form of rubber which serves them best. The tearing and maceration to which rubber in this form has been subjected are said to destroy the nerve of the crude product, the deterioration being specially noticeable in samples fresh from the estate. On the other hand we are told that sheet rubber not having been passed through tearing rollers, is of better quality, and when smoked is capable of being kept for quite a long period by the manufacturers. It is for these reasons that we expect a recurrence of the demand for smoked sheet in the near future, when market requirements for crepe have been satisfied. In the meantime planters will be well advised if they try to make themselves familiar with the preparation of crepe and smoked sheet. Crepe in any form should not be smoked; it should, from the manufacturer's point of view, be made in the thick blanket form.

It will surprise a few to learn that a considerable quantity of rubber has been sold forward for delivery during 1912. Many contracts were entered into during last year, and the first quarter of 1912 has shown a large addition to the list.

In the early days the majority of forward contracts were entered into by companies who, for reasons best known to themselves, found the necessary accommodation thereby. In some few cases a price of 4s. per lb. was regarded as abnormally high and a forward contract was entered into in the belief that such a figure was not likely to be exceeded. Last year opinion on the subject was divided, some believing that business of this character was speculative in a high degree and could only be entered into by directors imbued with with the spirit of gambling. To-day one's view is much larger. Supplies are coming forth in very large quantities from the East; fluctuation in prices has been so great that even outsiders look upon the crude rubber market as the most speculative and uncertain in existence, and high prices are still ruling. Under these circumstances many directors consider it their duty to make certain, while the opportunity exists, to sell sufficient produce forward to the shareholders. Providing only a portion of the crop is sold forward we see no harm in the business, so long as the prices secured are above the normal. To refuse to sell forward even a part of the crop at a high price, when the future is extremely uncertain on all points except that of huge supplies, might be taken as a reflection on the common sense of those in authority. We maintain that the first duty of directors is to see that, given the opportunity, profits are definitely earned. There are several companies, who, though producing large crops, have never sold a frction of the crop forward; it would be interesting if those responsible sent us a statement of average prices realised.

The following list shows the forward contracts published in these columns from July 1st, 1911, up to date:—

Company.	Price per lb.		Quantity in Tons.	Period of Delivery.
	s.	d.		
Selangor	5	0 av.	60	Jan.—July—Dec.
Batu Caves	4	11½	33	Feb.—Dec.
Ulu Rantau	5	0½	10	March—Dec.
	4	9	24	Jan.—Dec.
Mount Austin	5	1	15	Jan.—June.
	5	0½	45	April—Dec.
Sungei Kapar	4	10	24	Jan.—Dec.
Serdang Central	4	8	12	Jan.—Dec.
Sungei Choh	4	10	12	Jan.—Dec.
Yatiyantota	4	9½	16	May—Dec.
Linggi	4/3 to 4/4		60	Jan.—Dec.
	4	9¾	7½	April—June.
	4	9½	7½	Jan.—March.
	4	9	15	July—Dec.
	4	8½	30	Jan.—Dec.
General Ceylon	4	10	18	Jan.—Sept.
Sungei Selak	4	11	3	April—June.
	4	9	12	July—Dec.
Klanang	4	11	12	Jan.—Dec.
	4	6½	12	Jan.—Dec.
Neboda	4	10	24	Feb.—Dec.
Kuala Selangor	4	8	30	Jan.—June.
	4	7½	30	July—Dec.
Sungei Reyla	4	8		
Jeram	5	0½	3	Jan.—March.
do	4	6	9	April—Dec.
Yataderia	4	8	18	Jan.—Dec.
Mergui	4	8½	12	Jan.—Dec.
	4	7½	24	Jan.—Dec.
Doranakande	4	9	3	Oct.—Dec.
Singapore United	4	6	12	Jan.—Dec.
Seaport	4	6	9	Jan.—Dec.
Allagar	4	6	18	Jan.—Dec.
Bandar Sumatra	4	7	6	Jan.—Dec.
Langkat Sumatra	4	6½	12	Jan.—Dec.
Sumatra Pará	4	10	6	Jan.—June.
Seremban	4	11½	18	April—Dec. 1912.
Sungei Way	5	0	11	Feb.—Dec.
	4	11	12	July—Dec.

Company.	Price per lb.	Quantity in Tons.	Period of Delivery.
Cicely	5 0	18	Jan.—Dec.
Consol Estates	4 11	11	Feb.—Dec.
Began Serai	5 0½	4½	April—Dec.
Glenshiel	4 6½	6	Jan.—Dec.
	4 9	3	Jan.—June
	4 8½	6	Jan.—Dec.
	4 10	6	July—Dec.
Damansara	5 0	5	Jan.—Dec.
Harpenden	5 0	24	Jan.—Dec.
Rubana	4 6	24	Jan.—Dec.
	4 6½	12	Jan.—Dec.
	4 9 av.	12	Jan.—Dec.
	5 0	12	Jan.—Dec.
Straits Rubber	4 6	90	Jan.—Dec.
	4 6½	12	Jan.—Dec.
	4 9	24	Jan.—Dec.
	5 0	36	Jan.—Dec.
	5 0	6	Jan.—June.
Sungei Kruit	5 1¼	6	Jan.—Dec.
Tali Ayer	4 6	18	Jan.—Dec.
	4 9	18	Jan.—Dec.
	4 0	12	Jan.—Dec.
Gula Kalumpong	4 9	18	Jan.—Dec.
	4 8½	18	Jan.—Dec.
	4 11½	20	March—Dec.
United Sumatra	4 10	6	Jan.—June.
Angola Malay	4 7	12	Jan.—Dec.
	4 6	12	Jan.—Dec.
	4 6	15	Jan.—Dec.
London Asiatic	4 6	12	Jan.—Dec.
United Serdang	4 6	15	Jan.—Dec.
Sapumalkande	4 6	12	Jan.—Dec.
Bukit Panjong	5 0	10	March—Dec.
Deviturai	5 0	11	Feb.—Dec.
Bukit Mertajam	5 1	6	Feb.—Dec.
Perambe	4 9	6	Jan.—Dec.
Kapar Pará	4 9	44	Feb.—Dec.

—*India-Rubber Journal.*

Manihot Dichotoma, or Jequie Manicoba.

Mr. Gilbert Railton writes in *Tropical Life*:—

As is well known, attention has only been called to the Manihot group of rubbers during the past few years, and, amongst other varieties to *Manihot dichotoma.*

The characteristics of *M. dichotoma* have been so well described by Dr. Ule and others that no further reference appears necessary on this point, but as plantations are only now beginning to come into bearing, a few notes from one who has had experience, both in plantations and in observing the growth of this plant in its native habitat, may be of interest to some of the readers of *Tropical Life.*

The district of Jequie in the State of Bahia, Brazil, where the *M. dichotoma* grows wild, is known as "Katingas" land, that is land originally bearing virgin forest which has been at some time burnt down and succeeded by a growth of bush and scrub. There is every appearance that at one time the rainfall was much greater than now, when rain as a rule, only falls for about three months in the year. No particulars of rainfall are obtainable except for the last two or three years, in which it has not exceeded 32 in. per annum, and this appears sufficient for the growth of the tree.

The writer has seen a few trees growing in other districts where the rainfall is much greater, and though the trees grow to a larger size and give a greater quantity of latex, the amount of actual rubber present in the latex appears to be but very small.

M. dichotoma will not thrive in marshy or low-lying situations. Good drainage is imperative and a hill side, gently sloping, is the best situation. Hill-tops or high wind-swept plateaux are not suitable as the trees are easily broken off by high winds. The average height above sea level of the Jequie district is estimated at 2,000 ft.

The soil in which the *M. dichotoma* grows best is a reddish, light, fine, sandy loam, which in Jequie, after rain, quickly bakes hard like brick, on the surface, doubtless conserving the moisture beneath to some extent, as for the most part the surface does not crack. It has been noticed that where the soil does crack, the trees do not thrive so well.

It is practically impossible, owing to the hardness of the crust to keep the surface broken up, as the ordinary hoe will hardly touch it during dry weather. It has been found that the trees grow better where the bush has been burnt and the ash has become incorporated with the soil. The soil of unburnt land, which doubtless contains iron, has been usually found to be slightly acid. Possibly this accounts for the benefit derived from the wood ash sweetening the soil.

Grey and almost black soils are also found in the district, but the trees only grow to a small size in these soils.

It may here be mentioned that cultivation for all crops, including rubber, in this part of Brazil is of the most primitive description and consists merely in cutting down and burning the bush, after which when the rains come, chop holes are made with hoe and seeds planted. In the case of other crops, after two or three years, when the land becomes very weedy, it is abandoned and left as pasture for cattle and a new patch cut down and burnt, this proving less trouble than weeding.

Consequently, when rubber plantations were first made, the same practice was followed, with the result that many of the plantations were choked with weeds to a height of 6 to 8 feet, and though some have now been cleared, the result of such neglect is very apparent in the irregular growth and poor "stand" of plants in the plantations. The dense growth of weeds is also a serious menace owing to the danger of fire, which has in many cases destroyed whole plantations.

Fences too are usually neglected and much damage is done by cattle, goats and other animals breaking down the trees which, in the young stage, are exceedingly brittle. The green leaves during the dry season seem irresistible to cattle, &c., and fences, apparently strong, are broken down in the efforts of stock to get to them, the cattle for the most part being almost wild.

Both transplanting saplings from nurseries and also cuttings has been tried, but proved unsatisfactory, planting seeds, *i.e.*, at stake where they are to grow, giving best results by far.

The tap-root of saplings is so long and the root bark so tender, stripping off at the slightest touch, that it is impossible to avoid injury in transplanting, from which the tree never properly recovers. Cuttings are even worse. Although growth is quicker, the slips appear to make shallow lateral roots with no main tap-root, with the result that the tree is blown over and uprooted by the first high wind, this also applying to saplings for a like reason.

Seeds previous to planting, should be well ripened in the sun or kept on a dry floor for at least nine months after falling from the tree, as otherwise germination is very irregular. Usually they are planted two or three in a hole about an inch deep, but this appears too shallow, as in the event of slow germination the seed is probably disturbed and the germ killed by subsequent hoeing of weeds.

In favourable weather the seeds germinate, as a rule, in about ten days and quickly attain a height of about 2 feet, after which the young plant can withstand a considerable amount of drought, the tap-root being at this stage some 18 inches long. A wet surface soil and dry sub-soil is not conducive to a healthy growth, as the tap-root suffers at the expense of the shallow lateral roots. Soaking the seeds in water for a week previous to planting has been tried and doubtless hastens germination, but in the event of dry weather supervening, may prove disastrous, nor if the seeds have been properly ripened and are planted in favourable weather, is soaking necessary.

The following method of planting has also been tried with good results. A shallow hole, a foot or 18 inches in diameter, was scraped out with the hoe, and a hole about 9 inches deep made with a crow-bar, and the seeds dropped in, but the hole not filled up. This was done in the dry season and when rains came the fine rich surface soil was washed into the hole. The seed readily germinated and the rains from time to time washed more fine soil into the hole, gradually earthing up and keeping cool the roots of the young plant. Trees so planted from seed attained a height of 6 feet and over, with a diameter of about an inch in nine months. At a height of 60 to 70 feet, if no branching takes place, the trees should be "topped."

Labour being somewhat independent in the Jequie district, the labourers go off to plant their own beans, mealies, &c., during rains, and the foregoing method has the advantage that seeds may be planted in the dry season and the small, deep hole renders them less liable to be carried away and dug up by rats and pigs than when planted in the usual method. These animals are extremely fond of the seeds and must be at all times guarded against.

The average day temperature in the shade was 80-84 degrees F., falling at night as low as 54 degrees F.

With regard to shade, this is not desirable, at any rate, during the first few years of growth, only conducing to leggy, weak stems. Opinions are divided and it has still to be ascertained whether shade other than the natural shade of the tree is desirable. Certainly the tree, *per se*, does not require it, but whether additional shade has any effect on the flow of latex remains to be proved.

It is usually stated that trees may be tapped at 4 to 5 years old. While this is quite true, it is doubtful whether a payable quantity of rubber would be secured, tapping labour being dear in the Jequie district, costing equivalent to at least 2s. per day, while it is difficult to procure careful tappers to work at that rate, tappers preferring to go into the wild bush and tap how and where they like, killing innumerable trees in the process. At 4 to 5 years old, given good treatment and everything being favourable, the trees will have attained a diameter of about 4 to 5 inches. The bark, however, is but thin and full of resin and sap, the latex being consequently poor in actual rubber. A light tapping at this age may have a beneficial effect on the tree, but the writer would prefer to leave the tree in its natural state till it attained an age of at least 8 years.

It is difficult to state how long it takes for the wound to heal up, so much depending on the state of the weather, but under favourable circumstances the cut will heal up in eight to ten weeks.

All methods of tapping have been tried, also incision and picking but, from a variety of causes, nothing succeeds so well as a series of oblique lateral grooves 9 inches apart, resembling the full herringbone system without the vertical groove.

The lateral obliquely cut grooves should not meet at the apex, but at least an inch should separate them from joining, otherwise the bark remaining at the apex is apt to die off and this dying off ultimately spreads to the rest of the tree.

The old stumps left after burning are never removed, and so far no ill effects have been found owing to their presence. Wood ants only attack trees dying from over-tapping. Black ants occasionally eat the leaves, but the damage does not appear serious, and both varieties are easily kept in check by the use of a suitable insecticide.

So far the only other insect pest observed has been the mandioca caterpillar, which strips the trees of their leaves and doubtless this to a slight extent, hardly noticeable, retards growth. This pest can easily be kept in check by the use of Paris Green or other suitable stomach poison being sprayed on.

The latex coagulates very quickly and at times, when plantations are at a distance from the factory, it becomes soiled before it can be treated to rid it of impurities. In the Jequie district only handpower roller machines are used and these appear only to free the coagulum from resin. Water is generally somewhat scarce and this also makes the treatment of the coagulum rather difficult. As a rule the latex is poured from the cups into larger tin cans, where it coagulates, arriving in the factory in the shape of a Stilton cheese. This is then cut spirally into sheets about ¼ inch thick, passed between the cylinders, and washed and hung up to dry for from three to six weeks.

If it will not result in injury to the quality of the rubber it would be interesting to experiment with an anti-coagulant, spraying it on to the grooves and placing a few drops in the bottom of each cup. The latex could then be brought to the factory in liquid form, and subsequently treated like Hevea latex and smoked, if found desirable.

Catch crops have been tried on some estates, and of these cotton seems likely to prove the most remunerative, but only during the first few years of the rubber growth. The rubber should be planted 6 ft. to 8 ft. apart, both in rows and in the lines, this being a suitable apart for the full-grown rubber trees, and allowing for one row (or two, planted *en echelon*) of cotton in between the rows of rubber. This should at least, where transport is not too expensive, pay for weeding. In some cases the labourers have been allowed to plant provision crops (except mandioca) between the rubber in return for weeding, but this, though better than the former total neglect of weeding, has rarely proved entirely satisfactory.

It has been stated that tapping may be repeated every fortnight, but in the writer's opinion, this is excessive, and, besides, has been found not to give a payable quantity of latex at each tapping. Paring the lower side of the groove has also been tried, but the same remark applies, the best system proving to be a series of grooves cut in new bark each time, With regard to the yield from plantations, data are yet hardly complete, and, such as they are, have doubtless been interfered with owing to drought, shortness of labour, and from other causes. It may safely be said, however, that on an average, a six-year-old tree, properly treated from time of sowing, will give at least 4 oz. of dry rubber per annum.

There appear to be many varieties of the *M. dichotoma.* Some have leaves with white mid rib, others dark red, while the bark similarly differs, from smooth silvery grey to rough almost black, and there are found all grades in between, so that there is a wide field open for improvement by seed selection and standardization, as there is no doubt some varieties give more latex than others.

It is to be feared, however, that little will ever be done in this direction by the uneducated Brazilian estate owner. but the hint may not be lost on the Government, or on European managers or owners, either in Brazil or other countries.

A Latex Tank.

Grenier's Rubber News contains the following about "a Novel Departure on an F. M. S. Estate, Economising Time and Labour":--

In our Representative's report on the Port Swettenham Rubber Company's estate near Klang mention is made of two features --one being a reservoir for the storage of water for the estate's use, and the other a latex tank which, in consideration of its importance as an economiser of time and labour, we deal with specially. We have never seen it anywhere else and Mr. S. P. Ellis deserves credit for evolving the idea and putting it into practical shape. The tank, which has a 200-gallon capacity, is lined on its bottom and sides with white, glazed tiles. All first latex is put into this tank, and when it is full acetic acid to a mixture of 1 to 10 parts water is thrown in, and evenly distributed throughout the tank. The bubbles are next removed, wooden partitions are thereupon placed along the length of the tank, and corrugated iron bars next placed, to keep the coagulating latex under water, the whole process being completed by the covering over of the tank with a red-cloth screen, so as to prevent oxidation by the light. Early next morning the long sheets of coagulated rubber are put through a hand mangle, following which they are worked through a diamond-pattern mangle on to a long wooden bench, 18 feet long, which corresponds with the length of the tank, and as each sheet comes out from the mangle and is moved along the length of the bench it is immediately cut into divisions which correspond again exactly with the cases in which it is packed. The rubber is next hung up to dry and smoked. It will be seen from the above operations that the scores of enamelled coagulating cans, so generally used, can be dispensed with, that a uniformity in length, breadth and thickness of the rubber is ensured, that a considerable amount of time is saved, that all big machinery becomes a superfluity and that as few as four men are sufficient to carry on the operations. By the tank system all first latex is manufactured into sheet, and as a result all the rubber produced preserves its tensile strength. It is only the inferior latex obtained from the bark shavings, cup washings and from other sources which Mr. Ellis, the originator of this tank system, manufactures into crepe, and in the manufacturing of which he uses the bigger machinery. We examined the sheets turned out by the tank *cum* mangle process and found them to be excellent. They command a good sale at Singapore and Mr. Ellis is manufacturing a large supply of them for the coming New York Exhibition, where tests of tensile strength will, no doubt, inview of the large manufacturing element which will be represented at the show, be carried out with much observance.

The Planters' Chronicle.

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(INCORPORATED.)

To Bee Keepers.

Logwood (*Haematoxylon campechiannum*, introduced into Ceylon as a honey plant on the recommendation of the Bee Committee, has flowered and promises well. Coriander (*Coriandrum sativum*) is said to provide excellent bee pasture.

The Labour Problem.

This matter has attracted the attention of the *Economist* (London), which writes as follows:—

"The labour problem of tropical plantation work is not like that of Great Britain—to find employment for all—but to find workers to put through the necessary work. There are few estates so favourably situated that enough resident labour is available, and in consequence the importation of workers has become a necessity. Paternal governments in various places have tried to protect the labourers, putting barriers in the way of free immigration to large areas of active employment. Assam, Dooars, Southern India, Ceylon, and the Straits Settlements are all anxious for recruits to carry out the great developments of production that have been planned. The matter has now become of more than local consequence, and in view of the great importance to the tropical planting industries, which have given a chance for enterprising careers to so many of the youth of the British Isles and profitable fields for investing capital to so many others, an Imperial Commission might well be charged with the duty of organising and improving the methods of removing labourers from where they have to live poorly on meagre earnings to the places where work awaits them on terms of remuneration far beyond any possibility of acquisition in their locality of birth."

The National Bank of India, Ltd.

In a letter dated 11th instant the Manager, National Bank of India, Ltd., Madras, writes:—

"I have the pleasure to inform you that I have received advice by wire from my Head Office in London that the net profits of the Bank for the year ended 31st December 1911, including the amount brought forward from the previous year, amount to about £293,369.

"The Directors propose to pay a Dividend for half-year at the rate of 12% per annum, to place to credit of Reserve Fund £50,000 in addition to £50,000 added in September, to place £10,000 to credit of Officers' Pension Fund, and to write off £10,000 from Premises Account, leaving £53,368 to be carried forward to the next account.

Scientific Officer's Papers.

XCIII.—SOME SOIL PROBLEMS.

The physical and chemical composition of the soil is very complicated, and this added to the fact that it contains a microscopic flora and teems with bacteria and fungi, most of which have some ultimate effect if not a direct one upon the growth of the higher plants and crops, renders the problem of dealing with it a most difficult one, and complicates the question of the best manures to apply for any given crop, a question which at first sight may appear a simple one. We know that the crop will respond to the addition of three main plant foods, Nitrogen, Phosphoric Acid, and Potash, and also sometimes to Lime, but when we have to consider in what form these should be applied, and in what quantities, we are immediately faced by many difficulties. Fertilizers influence many factors which contribute toward plant production besides the direct nutrient factor. It is this additional influence which makes fertilisers inefficient when improperly used, and to it is due their capriciousness when applied on the theory of lacking plant food in the soil.

The capacity of any soil for producing a crop depends on its power to feed that crop, and this feeding power depends on the amount of plant food in the soil and the rate at which it is liberated, and made soluble and available for the plant. A chemical analysis shows how much plant food is actually present in the soil and so is a measure of its fertility, but the rate at which this plant food is liberated is governed by many factors, only some of which can be controlled by human agency. The most important controllable factors are Lime and decaying organic matter. As the organic matter decays, decomposition products are formed, a quantity of carbonic acid, some nitric acid, and various organic acids, and these have the power to act on the soil and dissolve the mineral plant foods, furnishing nitrates, phosphates, and salts of potassium, magnesium, calcium, etc., for the use of the crop. Fresh organic matter decomposes much more quickly than old humus which represents the organic residues most resistant to decay which thus gradually accumulate in the soil. The decay of the old humus can be hastened by aeration, that is by tillage, and also by mixing with it fresh organic material such as cattle manure, compost, green dressings, etc. These latter decay rapidly and supply food for the bacteria which then attack and decompose the old humus.

The chemical nature of the organic matter in the soil has recently been receiving a good deal of attention in America, and in this connection an article published in the *Planters' Chronicle* on p. 117 of Vol. VII should be consulted. A Bulletin of the United States Department of Agriculture sums up the matter as follows :—

" It is evident that the organic matter of soils is made up of a large number of chemical compounds. This might very well be assumed on theoretical grounds, for plants, which constitute the greater portion of the material out of which the organic matter of soils is made, contain a vast number of chemical compounds that are added to the soil on the death and decay of the plants. Now, while there seems to be no disposition to question this fact, there has been the assumption on the part of many agriculturalists that in some mysterious way this conglomerate of plant compounds added to the soil becomes transformed by decomposition into a single group of closely related bodies, humic acid, etc., and that no matter how varied may be the organic remains, or how diverse the condition of decay, soils vary in organic matter chiefly in amount.

"While it is true that the tendency in the decay of organic matter is toward simpler compounds, and ultimately to a few simple compounds or the elements, the material known as soil organic matter is in the transition stage from the complex compounds of living organisms to the simple ultimate products. When the organic matter has decayed to the stage of such simple compounds as Ammonia, Nitric Acid, free Nitrogen, or Carbon dioxide, it is no longer organic matter, and much of it may escape from the soil altogether.

"The complexity of the organic matter makes the interpretation of soil phenomena, in the light of its chemical composition, more difficult, and emphasises the need of a thorough understanding of the nature of this material in handling properly the chemical, physical, and biological problems presented by soils."

The physical condition of the soil plays almost as large a part in the well-being of the plants growing in it as the chemical composition. In 'Botany of to-day' the author, Mr. G. F. Scott Elliott, draws the following vivid picture of the interior of the soil and what goes on there :—

"The layer of soil upon which plant life depends is exceedingly thin. It is hardly ever more than a few feet, and often it is but a very few inches in thickness. The earth itself is porous and crumbly, made up of tiny sharp-edged particles utterly irregular in shape, varying in size and of the most different constitution. Some are organic, others inorganic ; there may be particles of sharp quartz which have defied plant action from the beginning of the world, and beside them silt or sand fragments which have been devoured by worms, rolled by water, attacked by acids, and utterly transformed in every geological period from the Silurian to our own days. One has first to realise the labyrinth of minute grottos and irregular winding fissures which penetrate in and amongst these particles. A thin film of moisture lines and carpets all these internal hollows, cracks, fissures, and miniature grottos ; in this moisture there is a liberal sprinkling of bacteria. Some of these germs are benevolent and will be breaking up the bodies of deceased insects, leaf mould and the like ; others may be Closterium or Azobacter forming nitrates: but many are malignant typhoid germs or vegetable fiends. Here and there one might see running through some of the caverns the exquisitely divided and finely branching threads of a mould fungus ; in another place a plant's roothairs or exploring rootlets which may be themselves clothed in a fringing mantle of fine fungus threads. All these rootlets and fungi are searching and probing patiently every film of moisture and absorbing the salts contained in it. The circulation of air in these underground passages and grottos is rapid and complex. Everything alive is breathing in Oxygen and giving out Carbonic Acid. The more oxygen there is the more energetic and intense is the life of every microbe and fungus and root. Some of the carbonic acid given off by the roots and fungi is employed in rendering soluble such refractory and stubborn minerals as silicates and aluminates which contain perhaps minute particles of valuable salts. Now suppose heavy rain falls steadily and for days together ; the soil is saturated so that the air is exhausted and perhaps millions of bacteria unintentionally commit suicide by carbonic acid poisoning. Others hurriedly form spores and await better times. The whole complex life of the soil is at a standstill. Then the rain stops, the sun and wind dry up the surface so that the water evaporates and the air passages become free again. Then at once with the advent of revivifying oxygen the whole complex machinery of underground life awakes again to vigorous activity."

RUDOLPH D. ANSTEAD, *Planting Expert.*

COFFEE.

Coffee in Southern Mexico.

Though mainly a 'financial article' a recent contribution by Mr. O. Sperber to *The Mexican Financier* on "Coffee in Southern Mexico" contains many facts whose reiteration in these pages will be of interest to those readers identified with the coffee industry. Says the writer, regarding the coffee plantations of Soconusco:

The coffee plantations of Soconusco are among the best of the kind found in any part of the world. Although limited to an area of some 22,000 acres, their yield during the past ten years amounted to $13,000,000 worth of coffee. Seventy per cent. of this production went abroad and the price paid for it contributed to enrich the common wealth of Mexico to the extent of $9,100,000,

By far the greatest number of coffee plantations in Soconusco are controlled by German capitalists from Bremen and Hamburg. Formerly many of these coffee planters divided their name and labour between Southern Mexico and Guatemala, where they also owned large coffee plantations, but in later times these last had to be given up, owing partly to the lack in that country of new lands suitable to a further development of the coffee industry, and partly to the unstable political and financial conditions of the country itself, which present an obstacle to fruitful operations.

The soil of Soconusco is particularly suitable to the cultivation of coffee. It consists of a rich deep humus of volcanic origin, with a slight proportion of lime. The climatic conditions of that region are likewise particularly favourable to the growth of the coffee plant.

Reliable reports covering 10 years give a yearly average of 204 days on which rain fell, the daily rainfall being 1'98 cm. This amount of moisture is an essential condition for the obtainment of a good coffee crop.

The coffee zone of Soconusco is subdivided in four distinct belts, this subdivision being the outcome of the particular character of the topography of that part of Mexico. Their altitude above sea level is as follows. First belt between 400 and 450 metres; second belt between 600 and 850 metres; third belt between 700 and 1450 metres; fourth belt between 700 and 1480 metres.

The produce of all four belts is of the highest quality, though it must be admitted that some of the plantations furnish a better quality than others.

The average cost of production per quintal of forty-six kg. of coffee, f. o. b., port of San Benito on the Pacific coast, is $5 to $7'50 approximately.

The market price for Soconusco coffee ranges from $10 to $15 and $20, thus yielding, at the lowest estimate, a net profit of $3'59 per forty-six kg. or $10'770 for 3,000 quintals.

Land calculation in Soconusco is as follows: One Caballeria equals 42'3 ha. equals 105 acres, equals 1000 cuerdas, each cuerda being planted with thirty-eight or thirty-nine coffee plants standing in triangles or a circumference of three and one-half to four yards. Thus an average crop is calculated to be one quintal to the cuerda,

The Valorization Scheme.

With reference to the circular issued by the Committee charged with the management of the San Paulo Government coffee, dated January 25, 1912, inviting tenders for about 300,000 bags of coffee, Messrs. J. Henry Schröder and Co., have announced that the tenders were opened on 12th ultimo, and all the coffee was allotted.

RUBBER.

Coagulating by Carbonic Acid.

(Our good friend, Mr. Wilhelm Pahl, of Dortmund, Germany, sends us the following regarding the use of his new re-agent for the coagulation of the latex of the *Hevea brasiliensis*. It will be noted that he called plantation Pará rubber *Hevea* rubber, and the wild product Pará rubber.)

Hevea (cultivated) rubber has gained the victory over Pará rubber. The mystery, which has up to the present day been hanging over Pará rubber, has been disclosed. The efficacious agent in coagulating Pará rubber has been discovered. Finally, it has been possible to replace the manual Pará coagulation by an *ideal mechanical coagulation*.

The science of chemistry has obtained the victory and torn the veil which had been hanging over Pará rubber. The whole rubber world and all the *Hevea* plantations have thereby gained an enormous advantage. It has been discovered that *carbonic acid* is the agent which ensures to the cultivated rubber the victory over all procedures heretofore employed.

The advantage which *Hevea* rubber now possesses, compared with Pará rubber, is best discerned by examining both methods thoroughly and by comparing their advantages. The new rubber combines the advantages of *Hevea* rubber and those of Pará rubber and shall consequently receive the name of *Hevea-Pará*.

Science—and, first of all, chemistry—has been endeavouring for decades to discover the agent which during the process of smoking gives to the Pará rubber obtained from the *Hevea* latex its strength, elasticity and superior quality. The most distinguished men of all civilized nations participated in these researches. During 1910 Dr. Frank and Dr. Marckwald, of the Chemical Laboratory, of Dr. Henriques Succ., Berlin, devoted themselves to this question. To this end they procured a few nuts of the Urukuti palm tree used for smoking Pará rubber, submitting their smoke to a close chemical examination. They discovered all sorts of substances, but did not find the most vital agent. We propose to submit hereafter the whole procedure of smoking to an exhaustive examination.

The rubber latex having been collected in the wild forest by the *seringueiros*, should now undergo the process of the extraction of the valuable Pará rubber from the latex. With this end in view, the *seringueiro* gathers dry wood, kindles a fire and then puts some nuts of the Urukuri palm tree upon it, thus obtaining a very dense smoke. Now, it is not difficult to reply to the question, why *seringueiro* employs the Urukuri nuts. These nuts are an excellent material for maintaining a good fire, because (1) they have an exceptionally hard shell, woodlike, thick and dry, and (2) they have rather oleaginous kernels.

It is difficult to find in a tropical wild forest dry wood, owing to the high degree of moisture in the air, and the wood having grown quickly and being soft, decomposes rapidly in many cases, which makes it a poor combustible. The palm tree nuts, however, give a perfect fire. The oil of the kernels serves to feed the fire, and it is a common experience that by burning dry and hard wood the best products of combustion are obtained. As is known, every hydrocarbon burns to carbonic acid and water. The smoke is more or less a secondary symptom and serves during the smoking process chiefly as a carrier of the carbonic acid which is drawn upward by the smoke; otherwise the carbonic acid would remain below, being heavier than air. The smoke contains also by-substances valuable for preservation, such as creosote, but this is less important than that in the present case it is the carrier of the carbonic acid.

Now it must not be lost sight of that the object of the smoke is to coagulate the latex and not, as has often been done, to smoke rubber, the coagulation of which has already been achieved. It must further be taken into consideration that the *seringueiro* pours the latex during the smoking procedure only while it is fluid over the stick, and to this end always makes fluid again such rubber as has already coagulated previous to the smoking procedure. It is obvious that this liquid latex must coagulate instantly, as otherwise it would again flow off. All trials hitherto made with the reagents found in the smoke never had the result of coagulating the latex instantly. It is solely the carbonic acid which causes the instantaneous coagulation.

The valuable properties which distinguish the Pará rubber produced by the smoking procedure are :—

1. Its elasticity ("Nerve").
2. That it keeps as carbonates the valuable metallic salts contained in the latex, and which are so very important for the consequent vulcanisation.
3. That it or the serum contained in the rubber reacts alkaline.
4. That it has no tendency to turn mouldy.
5. That it never rots.
6. That it never oxidizes.
7. That it contains rubber molecules of an extraordinarily high polymerization.
8. That, consequently, it vulcanizes extremely well.
9. The very great viscosity of the solution and the yielding quality resulting therefrom.

The *Hevea* rubber hitherto produced by the plantation possessed *none* of these valuable quantities. This is most astonishing, in view of the fact that the tree from whith the latex is collected is the same as the one from which Pará rubber is obtained *i.e.*, *Hevea brasiliensis*.

This *Hevea* has been exported from Brazil and transplanted under the same tropical condition and the same soil-qualities, especially to the Straits Settlements, where it developed to an exceedingly flourishing plantation tree. Since this trees furnishes a highly valuable product in Brazil it must, necessarily, give the same product in its new habitation, provided that the coagulation takes place under the same conditions. Owing to the enormous size of modern plantations it was, however, absolutely impossible to introduce the manual extraction of Pará rubber in the Straits. Therefore such methods of coagulation were adopted as would make it possible to extract the rubber by machinery, but by means of which an equally valuable product can never be gained. First of all acetic acid was found to be an agent which permitted an easy mechanical extraction of a product which, however, had great defects. The most serious defects are the following ones, *viz* :—

1. The coagulation with acetic acid takes too much time. According to the doses which are added to the latex its coagulation requires several hours, and in many cases even a whole day. If a quick coagulation is to be obtained, very large quantities of acetic acid must be employed. Now as regards the rubber produced with the aid of acetic acid it becomes gelatinous during the coagulation process, which is to be attributed to the fact that the rubber molecules do not receive sufficient polymerization.

2. Acetic acid also does not prevent the rubber thus obtained from getting mouldy very quickly, owing to the damp hot air in the tropics.

3. The rubber has no elasticity (nerve), and in consequence is inferior.

4. A very serious drawback of coagulation with acetic acid is that the metallic salts, which are of so great importance for the vulcanization, are precipitated as acetic salts. Now, these acetic salts make the rubber soft later on when it is to be used.

5. If acetic acid is used in quantities, small crystals like sand are developed in the rubber, and these crystals are precisely the injurious acetous compositions of the otherwise valuable metallic salts of the rubber.

6. The rubber coagulated with acetic acid has but a very inferior viscosity, which is the best proof that the polymerization of the rubber is the worst imaginable.

7. Further, the subsequent vulcanization does not furnish the valuable product of the Pará rubber. From the very beginning the rubber is lacking in elasticity (nerve). If up to the present plantation rubber coagulated with acetic acid has been able to fetch about the same high price as Pará, this result can *not* be attributed to the excellent quality of the *Hevea* plantation rubber, but solely to the fact that the rubber is put on the market in a clean and dry state without any loss in washing. If the values of Pará rubber and *Hevea* rubber are to be compared, it must be taken into consideration that Pará has 18 to 20 per cent. loss in washing (locked up serum), while plantation rubber does not sustain any loss in washing.

If they had continued to proceed with the extraction of plantation rubber in this direction (although the attempt has been made to change it by having recourse to all kinds of coagulation methods, which, however, consisted always in strong acids) then plantation *Hevea* rubber would constantly have remained in the background.

All this has been changed at one blow by the important discovery of carbonic acid as coagulation agent of the latex. For the whole plantation industry this discovery is the most important made in decades. The most remarkable part of it is the discovery that carbonic acid alone is the efficacions agent which conferred on the Pará rubber its past superiority. This discovery is very important, because plantation rubber in future produced in the simplest way imaginable by machinery is thereby so much improved that it far surpasses the wild Pará rubber in *quality, purity and strength.* In order to distinguish this new rubber from Pará rubber and the plantation *Hevea* rubber hitherto obtained by strong acids, it shall be called *Hevea Para,* which name it well deserves. The valuable qualities realised by the use of carbonic acid are the following:—

1. Carbonic acid coagulates the latex instantly. The latex is an emulsion of fluid rubber particles in conjunction with vegetable albumen. The reaction of carbonic acid on these albuminous vegetable substances is so vehement and efficacious that as a result the different rubber particles unite suddenly with the greatest vehemence, which bestows on the rubber obtained an exceedingly strong polymerization. The *Hevea* rubber thus produced possesses all the valuable qualities of Pará rubber.

2. The *Nerve* tensile ***strength*** and ***elasticity*** are superior to the same qualities in Pará rubber.

3. One of the chief advantages of ***Hevea Para*** lies in the fact that the valuable metallic salts of the latex are contained in the rubber as carbonates, just as with Pará, for they had been precipitated by aid of carbonic acid.

4. *Hevea Para* also is alkaline, for carbonic acid, as is well known, does not disturb the alkaline qualities.

5. *Hevea Para* possesses the same vicosity and yielding quality of the solution, and vulcanized furnishes the same valuable product as Pará.

6. Coagulation by carbonic acid is the cleanest process and gives the purest and lightest product.

7. The smoke, however, mixes many coal-particles with the Pará rubber.

8. *Hevea Para* never becomes mouldy, because the acid precipitates the vegetable albumen contained in the latex, and thereby destroys the whole fostering soil for these bacteria.

9. *Hevea Para*, just like Pará, can neither decay nor oxidize.

10. The rubber coagulated with acetic acid is quickly covered with a bluish coloured coating. This is due to the fact that the albumen still contained in the rubber in spite of the acetic acid, decomposes rapidly under the influence of light and climate, partly forming phenols at the same time. The phenols give the bluish colour to the rubber and depreciate it to second quality.

11. Carbonic acid renders it feasible for the first time to employ, just as for Pará, a gas for the coagulation instead of strong acids.

12. The employment of carbonic acid is exceedingly simple and may be entrusted to anybody. No exact weights have to be fixed, as in the case of acetic acid and all strong acids; each native may use as much carbonic acid as he likes. He never can do any harm to the product, the surplus of carbonic acid escaping as superfluous and inoffensive gas as soon as the spontaneous coagulation is finished.

13. Also the cheapest agent imaginable has been discovered in carbonic acid. The remarkable progress as regards the production and transport enable the rubber plantations to procure for themselves a good, valuable and cheap coagulation agent.

It is possible to produce 2 kilos. of carbonic acid with 1 kilo. of coal, whence the cheapness of carbonic acid follows.

14. Carbonic acid can be produced in all tropical countries because artificial carbonic waters are consumed there in almost every small town.

This new carbonic acid process has been patented in all countries, as it is of eminent importance for the whole plantation industry and for the whole rubber world, because at one blow it ensures the victory over Pará rubber to the *Hevea* rubber. Owing to the patent having been registered, every forbidden utilization, of course, will be punished by law, and every *Hevea Para* produced illegally without license will be confiscated on the strength of the patent law. It is very easy to ascertain by an analysis whether rubber has been produced with the aid of the new process or not.—*India Rubber World.*

Extracting Latex from Trees.

Under the head of "New Ideas and Inventions" the *India-Rubber Journal* publishes an illustration of a process recently patented. The following will perhaps give the reader a fair general idea of the system suggested, even though the illustration cannot be reproduced here.

Our contemporary observes:—

This invention relates to a method of and means for extracting latex from trees, and has for its object to obtain a better yield by means of suction.

The present methods entail considerable loss by reason of the latex coagulating or oxidizing by the action of the air. Not only is there very considerable scrap rubber, but by the process of coagulation and oxidization in the tappings leading to the channels, the natural flow of the latex is prevented because the tappings become sealed, and further the flow of the latex in the first instance is retarded by the atmospheric pressure thereon.

The new method consists in extracting by suction in any convenient manner rubber and other latex from the tree, without any outside influence, that is to say, without the atmospheric action or the oxidization of the latex.

The latex is conducted from the tree directly to a suitably covered receptacle, and it may be collected from the said receptacle and vulcanized and treated in any desired manner, such as by loading, &c.

Figure 1 shows a length of tubing actually around a tree in spiral fashion, and with plug valves inserted within the bark of the tree and leading to the tube.

Figure 2 shows an enlarged detail of the plug and a portion of the tubing. The tubing A in the example shown is provided with plug valves B, which may be pitched at a distance of say 6 inches apart. The valves B are inserted through the tubing A and thence into the bark of the tree.

The tube A may be provided with flanged sleeves to accommodate the plug valves and to prevent the collapsing of the tube by suction. The plug valves B may be provided with a central port b, which may have at the extremity of the valve four cut-away ports such as b^1, and leading from the central port b may be right angle ports b^5.

The depth of each plug inserted in the bark of the tree may be determined by adjusting the cap b^6, which is screwed on to one end of the plug valve, and so that by unscrewing or screwing the cap b^6 the length of the plug is determined.

The end of the tube leading towards the upper portion of the tree is perfectly provided with a water cup C, containing porous stone and also a float indicating arrangement such as c for the purpose of indicating the amount of water in the cup.

To prevent coagulation within the interior of the tube, water from the cup may be caused to trickle through the tube by the small suction set up in the tube. The water thus flows from the cup, and somewhat thins the latex and causes it to flow freely to the pump.

To the lower or other end of the tube there is connected a simple pump, for choice a single barrel type, capable of being operated by means of the employment of a fulcrummed lever, that is to say by the action of moving the lever up and down, the plunger of the pump is also operated.

The pump is provided at its lower portion with an inlet and an outlet; the inlet in one instance being connected to the latex tube and the outlet being provided with a branch leading to the latex receptacle. Each is provided with ball valves operating in opposite directions, that is to say, when suction is created in the latex tube, the ball valve of the inlet portion is pulled off its seat, against a stop. Simultaneously the ball valve of the outlet is pulled against the seat, and after the downward stroke of the plunger the ball value of the inlet is seated and the ball value of the outlet unseated.

With this arrangement of ball valves, it becomes possible to disconnect the latex tube from the inlet and connect it with the outlet, for the purpose of irrigating the tree after the whole of the latex has been extracted therefrom. In this case the outlet becomes the suction by the simple process of unscrewing the ball valve connections and reversing them.

It has been found in actual practice that it is of great importance that the rubber trees should be irrigated after the latex has been extracted therefrom, and further it is also of great value to return the unrecoverable caoutchouc globules, that is to say, the latex the residuum of the tree.

Preparatory to inserting the plug valves in the tree, a portion may be punched out of the bark of the tree, that is to say, a disc portion, by means of a separate punch, or the plug valve itself may be provided with a knife edge for punching the bark of the tree. All punchings from the bark of the tree should be saved and restored within the tappings. Patent No. 22,632' 1910, to William Clarkson, Friars Park, Lesmahagow, Scotland.—*India-Rubber Journal.*

Encouragement of Rubber Growing in Brazil.

The *Diario Official* of 16th January publishes a decree (No. 2543), dated 5th January, containing regulations designed to facilitate and develop the cultivation of the following species of Brazilian Rubber:—"Seringa," "caucho." "manicoba," and "mangaba." Exemption from Customs duty is granted in respect of any materials or apparatus required for the purpose in question. The following premiums are also provided:—For every 12 hectares (about 30 acres) of new land put under cultivation, 2,500 milreis for "seringa," 1,500 milreis for "caucho" or "manicoba," and 900 milreis for "mangaba"; for every 25 hectares (about 62 acres) of replanted land, 2,000 milreis, 1,000 milreis and 720 milreis in the same order. Experimental stations are to be established in various parts of the Republic. In addition to the above, the Government will devote, by way of an "encouragement premium," a sum not exceeding 1,000,000 milreis to promote the establishment of rubber refining works and factories for working up rubber goods. Provision is also made for road construction, and for the construction of railways (1) from a point near the mouth of the River Abunan to Vills Thaumaturgo, and (2) from Pará to Pirapora and to Coroata, with various branch lines. The executive authorities are also empowered to enter into an agreement with the States of Pará, Amazonas, and Matto Grosso for the purpose of obtaining (1) an annual reduction from 10 up to the maximum of 50 per cent. of the actual value of the export taxes levied by those States on "seringa" forest rubber produced in their respective territories and (2) exemption from any export tax whatever for a term of 25 years on plantation rubber of the same species and from the same district. Concurrently with the foregoing, the decree aims at granting a large measure of facilities for the encouragement of colonisation, agriculture, meat packing, &c., in connection with which it is proposed to grant premiums and exemption from customs duties.

Milreis 1*s*. 4*d*.

Coagulating Latex Tanks for Sheet Manufacture.

In our last issue we described a Latex Tank, for coagulating latex in long length sheet form, which we had seen on our visit to the Port Swettenham Rubber Company, at Klang; and we pointed out, what we considered, the attractive features of this form of manufacture.

We have since received the following letter from Mr. F. J. Ayris, of Tappah Road, Perak, and which we gladly publish as requested.

The letter says: "Your last issue contained a most interesting account of a "feature" on the Port Swettenham Rubber Company's estate near Klang *viz.*, a 'latex tank.' I am agreed with you entirely that such a system is an economiser of time and labour and is the ideal thing for turning out sheet uniform in length, breadth and thickness and allows every sheet being cut to fit the length of the case; but I fear you are totally wrong by saying Mr. S. P. Ellis is the originator of the idea for the simple reason, the system (without the white glazed tiles) has been in use on one estate in Negri Sembilan since the end of 1907 and on two estates in Perak since May 1909, and further the whole system was shown at the Rubber Exhibition in London last July, for and on behalf of the real inventor Mr. W. R. Rowland."

I enclose a handbook on the subject which Mr. Grenier Senr. may have overlooked, though seen and read in London.

The above remarks by Mr. Ayris bear out the features claimed by the latex tank we saw in use on the Port Swettenham Rubber Company's estate.

Mr. Ayris also forwards us a little "brochure" published by the "Singapore Pará Rubber Estate," issued in London at the time of the last Exhibition and which deals with their system of long length sheet rubber.

We understand that Mr. Ellis does not claim any "Patent rights" for this system—, and would be pleased to show any enquirer the latex tank in question.

Mr. Ellis is also aware that sheets, in long length, have been made elsewhere. The only originality Mr. Ellis claims is that his tank is of a permanent character, being of cement concrete, and lined with white glazed tiles, and is considerably cheaper to construct, than to purchase a huge number of enamelled latex pans besides a large reduction in cost of labour and handling.

Mr. Ellis tells us he started tapping in September 1910, long before the late Rubber Exhibition in London and he has never used any other form of coagulation for sheet rubber than the one now in use on the Port Swettenham Estate.

The "Brochure Pamphlet" referred to describes a series of long wooden troughs, and the use of certain "ladders" features which we did not see on Port Swettenham estate.

In conclusion we may state, that we do not consider it important, as to who might have been the first manager to manufacture sheet in long length coagulated form, but what we do consider important are the following queries:—

(1). Do the advantages claimed for the tank process justify the scrapping of a large number of enamelled Pans?

(2). Is it less costly in labour and handling—than the latex pan?

(3). Is the sheet rubber (so manufactured in Tank form) of a similar quality to that made in single sheet pans?

We think there can be no question as to the "uniformity" of the rubber manufactured in long length, and afterwards cut to fit packing cases. The above three questions we leave to our readers, and to those interested in the industry to decide.—*Grenier's Rubber News.*

SELECTED CUTTINGS.

The Combustion of Atmospheric Nitrogen.

(Paper read before the Chemists' Association at the annual meeting by Mr. CARLTON C. JAMES.)

The world's consumption of nitrate of soda in 1910 amounted to 2,251,000 tons with a value of about 78¾ millions of dollars. Practically all of this material comes from the natural saltpetre fields of Chili, a base of supply which cannot be considered inexhaustible by any means. In fact from estimates made in 1899 the nitre fields were expected to last for forty-six years and later estimates set the life of the fields at 75 to 100 years. Naturally another source of nitrogen would be desirable if we were to anticipate a bread famine and prevent it; for as Sir William Crookes pointed out some years ago in order to live we must have bread, and to have bread we must have wheat, and to grow wheat we must have nitrogen. There is abundance of nitrogen in the air, and when one stops to think that the nitrogen in the whole world's supply of soda, over 337 thousand tons, could be obtained from the atmosphere covering only twelve acres of the earth's surface, the possibilities for profit in exploiting the atmosphere become apparent.

The combustion of atmospheric nitrogen dates back to Henry Cavendish, who about 1780 discovered nitrogen in the air, determined the composition of air with such accuracy that his figures are practically unchanged to-day, and who disclosed the fact that nitrogen and oxygen slowly combine under the action of electrical discharges.

And to-day a cheap source of electrical energy is the important point in the fixation of atmospheric nitrogen and the manufacture of nitrate of lime upon a commercial scale. Consequently we find this infant industry starting in the countries supplying the largest and cheapest source of electrical energy, such as Norway where the kilowatt year is obtained for from $5'00 to $8'00, or in Switzerland where the cost ranges around $10'00.

Curiously enough the first attempt to obtain nitrogen from the air upon a commercial scale was made at Niagara Falls by Charles S. Bradley and D. Ross Lovejoy under their own patents. They formed the Atmospheric Products Company with a capital of $1,000,000 back in 1902, but after two years' work they had to suspend operations. The price of energy at Niagara Falls, about $20'00 per kilowatt year, probably had a good deal to do with the failure of this enterprise. Since Bradley and Lovejoy's experiments we find a number of methods have been patented and are in use, or have been tried, in countries having cheap water power. The process which seems to have given satisfaction for the longest time is one devised by Birkeland and Eyde in Norway.

This process consists briefly of driving a current of air through a chamber in which it comes in contact with an electric arc situated in a magnetic field. The electrodes are fork shaped, water cooled, and are set perpendicular to the lines of magnetic force so that the discharges form a disc of sparks. When once set these arcs burn weeks without regulation and the electrodes last for months. There is a limiting value, however, to the formation of nitric oxide, about 5%, and at the higher temperatures at which the oxidation takes place the action is reversible. It will be seen then that the important point in working the furnaces is to have the reaction take place at the highest temperature of the arc in order to get a high yield of nitric oxide and then to quickly cool the gas so that the reverse action does not take place. This has been accomplished in practice by sweeping the gas out of the region of the arc so as to be instantly cooled by the surrounding air, and by electrical and mechanical means whereby the arcs are interrupted several thousand times a second.

The waste heat from the treated air is used under the boilers for evaporating and concentrating purposes, and is then conducted to oxidation tanks where the NO is gradually changed to nitrogen peroxide as soon as the temperature falls below 600°C. by the excess oxygen always present. The gases then enter absorption towers filled with broken quartz or acid proof stones and down which dilute nitric acid slowly runs. When the acid reaches the proper concentration it is drawn for shipment or for the treating of either soda or lime to form nitrates. The oxides of nitrogen which escape the absorption towers are carried up a wooden tower in which they meet a fine spray of soda solution and are fixed as a weak solution of sodium nitrate and nitrite. From the nitric acid nitrate of soda, nitrate of potash, nitrate of lime, or ammonium nitrate may be formed. As a good quality of limestone is found near Notodden, where the Birkeland-Eyde system is installed, and as soda would have to be imported for manufacturing sodium nitrate, nitrate of lime has been the finished product. The limestone is treated with weak nitric acid and a dilute solution of nitrate of lime formed which is concentrated, crystalized and ground. It is then packed in tight barrels of about 220 pounds.

In 1909 the Notodden works produced 12,600 tons nitrate of lime, 2,700 tons nitrate of soda, and 370 tons of sodium nitrate and nitric mixed. The markets of Europe have absorbed this output and will probably continue to do so to a greater or less extent for some time to come. The combustion of atmospheric nitrogen has passed out of the experimental stage and to-day is a thriving infant industry. It is simply a matter of time until nitrate of lime is as well known to the commercial and agricultural world as nitrate of soda.

West African Planting.

ITS POSSIBILITIES AND FAILURES.

In the third of a series of papers in the *Rubber World*, Mr. H. Osman Newland, Hony. Secretary, British West African Association, discusses "Types of Rubber for West African Soils."

Having indicated that the principal causes of failures in West African plantations arise not so much in the country itself, but from mistakes in London, which should be prevented in the future by utilisation of the knowledge and facilities of the British West African Association, let us briefly examine the possibilities of plantations situated close to the railway or a river always navigable. First, as regards rubber—What are the best varieties? That depends upon the nature of the soil, drainage and climatic conditions. To grow *Hevea brasiliensis* upon soil which is waterlogged in the wet season, or which exposes the roots to the Harmatan wind in the dry season, is to spell disappointment from the first. Whenever I see a prospectus also which professes to have gold as well as rubber upon its estate, I always feel doubtful for the success of the rubber, particularly if it is Hevea. I have never known good Hevea come from the same place as, or in close proximity to gold. But *Manihot glaziovii* (Ceará) will flourish in places where the Hevea will not—on sloping hillsides, in stony soil of little depth, in Mysore (where also gold is found). Manihot rubber also yields Latex at three years of age—frequently earlier—and it is more free from pests, unless cassava—which is botanically allied to the Ceará, being also a Manihot—is planted round it as a catch crop. Good results have been obtained from experimental tappings on a Sierra Leone plantation where it is being extensively planted, and also, I am told, from those made by the Gold Coast botanical authorities. It is surprising that so few of the Gold Coast rubber companies have not tried the Ceará. Even the Congo Government recognise the advantages and possibilities of this rubber, and experiments with it have been made at more than twenty stations upon about 200,000 trees. The price fetched by this rubber is almost as much as that fetched by Hevea, and at Antwerp it has a better market than Mincing Lane, a fact which has probably influenced the London Produce Clearing House to include rubber in its transactions, and thus arouse the wrath of Mincing Lane which has been unkind to African rubber.

In speaking thus of Manihot, I do not wish, however, to deprecate either the indigenous *Funtumia elastica*—which I believe, has a future before it—or the Hevea which is now being extensively planted in the Congo and Nigeria at the Gold Coast experimental station, and on a plantation in Sierra Leone. *Funtumia elastica* trees of six years old have been proved to yield 100 grammes, representing a return of 62½ kilos per hectare (about 1½ acres) of 625 trees. Hevea is said to be answering well in Nigeria, the Congo and French Guinea, while on the Sierra Leone plantation previously referred to over 80 per cent. of the Hevea stumps imported from Ceylon have been successfully established. In spite also of the preference of the London market for Pará rubber from the Straits, the present war between the London Produce Clearing House and Mincing Lane should materially help the Hevea from the Coast, added to which are the possibilities of a new industry in extracting oil from the Pará rubber seed, which should prove lucrative even to those whose trees are not producing latex to their entire satisfaction.

With the importance of manuring and the planting of suitable catch crops on West African rubber plantations I have dealt in previous articles of *The Rubber World*. There need now only be added one warning and one recommendation. The warning is that of planting pine-apples right up to rubber trees. Messrs. Boustead and Mr. John Turner have condemned this practice in the Straits, and in West Africa the temptation is as likely to arise as in the F. M. S. The recommendation is for planting *coffea robusta* in bands between the rubber about six or seven feet from the rubber rows, and about five feet from each other. These plants begin to flower after about eight months but if these early flowers do not develop into berries, there need be no concern as all later berries set. This coffee plant blossoms all the year round, and if collected once a month there will be no windfall of berries. Within twelve months the berries mature, and the maximum crop is gained in the fourth year. *Coffea robusta* can also be successfully planted among cocoanuts, eight feet from the cocoanuts and seven feet from each other.

The Definite Purpose in Agricultural Work.

In the *Experiment Station Record* of the United States Department of Agriculture there occurs a thoughtful editorial note in which it is pointed out that, in the developments that are now taking place in the United States, the functions of various organizations are becoming more defined and specialized; that it is the duty of certain organizations to undertake the imparting and dissemination of agricultural knowledge in its widest sense —a function expressed in the article referred to by the phrase Extension Work; while it is the concern of the experiment, stations to carry out investigations, research and experiment, without having the necessity pressed upon them of popularizing their work and bringing it to the close attention of those for whom it is done.

It is argued that the publications of various departments or organizations should tend to make this distinction; but it is complained that, so far from this being the case, most of the publications tend to mask the distinction, and mislead the public as to the nature and functions of the institutions from which they issued. The complaint is definitely stated in the following way: 'The number of publications (of the experiment stations) has greatly increased, but in the majority of cases this increase is not made up of accounts of the station's activity as a research institution. It consists largely in the number of popular and informational bulletins and circulars, which relate to the extension department rather than to the experiment station proper. These are merged in the general station series in a manner which often gives a wrong impression.'

With the large areas and wide interests covered by the Department of Agriculture of the United States and the various organizations connected therewith, there is little doubt, observes the *Agricultural News*, that such an effort at specialization as is here suggested will be of immense service in economizing the energies of those engaged in the various duties and in informing the public for whose benefit these organizations or institutions exist, of the real nature of the duties they profess to undertake. In this way the public is enabled to judge more accurately of the value of the work that is done, and incidentally to form a clear idea of the needs of the institutions and to ensure the proper appropriation of funds, and of other means of support and management.

To scientific workers in agriculture, the specialization aimed at would prove to be of great assistance. The immense volume of agricultural literature renders it impossible for any individual to deal with more than a very limited portion, and there is always the fear that some important point may escape notice; while the feeling also exists that valuable time may be lost by expert workers in reading much material having solely for its object the presentation of well-known, established facts in a form that will render them attractive and ultimately serviceable to less informed readers.

What is said with regard to publications may in a great measure apply to the institutions themselves. Under the large conditions of the United States, it is possible to ask for a marked degree of specialization in the work of various institutions dealing with agricultural matter in their different phases; hence, as time goes on, increasingly complete severance of such functions as teaching and investigating, and of specialization in these branches themselves, may be expected. With large communities and complex conditions, specialization is an essential feature of development; but one which, if carried to extremes, brings concomitant disadvantages.

In turning attention to colonial and particularly West Indian conditions, it is readily seen these preclude specializations in any high degree; indeed, a feature of colonial life is its requirement of ability to cope with a wide range of conditions and circumstances and to perform functions that, in older or larger communities, would be assigned to special experts. This phase was largely in evidence in the United States until quite recently, but appears, at least, in populous centres, to be passing away. It is a state that still exists to a considerable extent in communites in the West Indies.

This condition is reflected in the work of local Department of Agriculture in the West Indies, with their associated Botanic and Expeaiment Stations. Popular conception, rarely precise, demands of these most diverse duties—duties that fluctuate largely from year to year with the changes in local conditions and needs. These institutions are required to combine the functions of experimenting in the introduction of new crops and new methods of the improvement of old ones; of performing the duties known as extension work, that is to say the efforts at popularizing and applying the knowledge so gained; while at the same time they are called upon to act as centres for the distribution of plants and seeds needed for local industries, thus undertaking many of the functions which in larger places devolve upon commercial nurserymen. Further, they are regarded as the repositories of information concerning local agricultural industries, and particularly as regards difficulties or troubles that may arise, as for example, in connection with pests or diseases, or imperfect methods of dealing either with soils or products.

Benefit to Crops from growing them with Legumes.

Work has been done recently at the Agricultural Experiment Station of the College of Agriculture, Cornell University, for the purpose of ascertaining, on a practical scale, if the growing of leguminous crops with other plants results in any benefit to the latter, besides that arising from the addition of nitrogen that legumes are able to effect with the aid of the nodule organisms in the roots. A positive answer to the question appears to have been obtained, and this is expressed in the following way, in a summary to Bulletin No. 294 of the Station, dealing with the work:—

Timothy grown with alfalfa contained a greater percentage of protein than did timothy grown alone. The same was true of timothy grown with red clover.

Oats grown with peas had a higher protein content than oats grown alone. The yield of the mixed oats and peas, when cut for hay, was considerably greater than the yield of oats alone.

The increased value of the non-legume, due to its greater nitrogen content, when grown with a legume, is of some economic importance. A method for increasing the protein content of certain forage crops by growing them with legumes is thus suggested.

The increased supply of available nitrogen, which these results indicate to be due to the presence of the legume, must have a very important influence on the yield of the non-legume on soils where nitrogen is the limiting factor in the growth of the crop.

Soil on which alfalfa had grown for five years contained more nitrates than did soil which had grown timothy for the same length of time. Sections of these same plants kept bare of vegetation for the summer gave similar results.

The nitrifying power of a soil which grew alfalfa for five years and which was then kept bare of vegetation for a summer was greater than that of adjacent plots on which timothy had been grown for the same length of time, and which was likewise kept bare for a summer. This indicates a benefit arising from the influence of the legume on the rate at which nitrification goes on in the soil even after the crop has been removed.

Alfalfa grown on soil in need of lime contained a higher percentage of protein when lime was added to the soil than when none was added. The weed *Erigeron annuus* growing with the alfalfa possessed a higher protein content when grown on the limed soil. Ammonium sulphate, when added to the limed and to the unlimed soil, nitrified more rapidly in the former.

The greater protein content of a non-legume when grown with a legume on a soil containing sufficient lime, as compared with one deficient in lime, is apparently due to the more abundant formation of nitrates under these conditions.—*Agricultural News.*

The Planters' Chronicle.

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(INCORPORATED.)

In re Insolvency of Messrs. Arbuthnot & Co.

A fourth dividend, yielding Rs. 227-2-11, has been collected for account of the Association.

An Inquiry.

Mr. G. L. Duncan, of Valparai, writes to the Editor as follows:—

"Can you, or any of your readers, inform me whether one can claim, I mean as a right, Police protection when transporting a large sum of money (in coin) to an outlying part of a district.

"I was rather surprised to receive a curt refusal some days ago from the District Superintendent of Police to a request of mine for an escort, especially as I had obtained such on several occasions without demur."

New York Rubber Exposition.

Mr. J. A. Richardson writes:—

"While passing through Colombo I saw several firms interested in Southern India with reference to the above Exhibition. With the exception of one firm, all were in favour of Southern India being represented, more especially if the expense can be spread over other products such as Tea, Coffee, Cardamoms, &c. It was also pointed out to me that if Tea was included, we might quite well approach the Indian Tea Association for a donation towards the scheme. Of course there is very little time left to decide, but I am sure every one must feel that if Ceylon, the Straits and all other Rubber producing countries are represented, it will look very bad if Southern India does not. I had the assurance of several Ceylon Companies that if the subscription be general, they were quite willing and anxious to support it." . . .

In Ceylon the Planters' Association has been informed that His Excellency the Governor has been pleased to direct that, subject to the approval of the Secretary of State, the contribution from Government towards the cost of the representation of Ceylon at the above Exhibition be fixed at Rs.25,000 and further that the Hon'ble Mr. L. W. Booth, the Hon'ble Mr. Bernard Senior, Dr. R. H. Lock, and Dr. Joseph Pearson had been appointed to represent Government on the local joint Committee.

The *Ceylon Observer* judges from this that "it is clear that the New York Rubber Exhibition is to be well supported, as far as Ceylon is concerned."

Scientific Officer's Papers.

XCIV.—LEAVES.

By means of the green colouring matter, Chlorophyll, contained in their leaves the higher plants decompose the Carbon dioxide, which constitutes from ·03 to 0·4 per cent. of the total volume of dry air, and cause its Carbon to enter into various combinations such as starches, sugars, fats, gums and proteins and the woody tissues of their stems and branches. Lower plants, among them the microscopic algae, are enabled by virtue of their chlorophyll, or of other colouring matters allied to chlorophyll, to decompose the carbon dioxide of the air and to build out of the carbon various and numerous complicated organic substances.

The decomposition of the carbon dioxide by means of chlorophyll can only be effected in the presence of sunlight, for this furnishes the energy necessary for breaking up of the carbon dioxide molecules. In this way simple mineral salts and water derived from the soil, and carbon derived from the air are changed into the numerous and almost endless varieties of substances found in the vegetable kingdom.

As would naturally be expected therefore the internal mechanism of a leaf is very wonderful.

If a leaf be held up to the light it will be seen to possess a mesh work of veins, generally branching out more or less regularly from a large central vein called the *mid-rib*, the branches dividing again and again, each division getting smaller and finer until they end in extremely slender branchlets. The *mid-rib* is in direct communication with the stem and it is along these veins that the water from the roots is supplied to the leaf and along them also that the organic substances spoken of above are conducted into the body of the plant to be used or stored. The finest ramification of the veins in the leaf is in continuous connection in fact with the rootlets which are absorbing water and the mineral plant foods dissolved in it from the soil. This connective tissue is made up of a series of cells which act like pipes known as the Bast or Phloem, and Xylem.

Stretched between the veins is the thin green tissue of the leaf. When a cross section of this is examined under the microscope it is seen to consist of two distinct layers with different structures. The upper part consists of a few layers of closely packed cells which are elongated in a direction at right angles to the surface of the leaf, and from the appearance of this upright and regular arrangement of cells it is called the *palisade parenchyma.* These cells are packed with green chlorophyll grains and it is here that the chemical processes spoken of at the beginning take place. This surface of the leaf is kept turned towards the sunlight by the plant and is always placed so as to receive the maximum amount of light.

The lower half of the leaf tissue consists of very loosely arranged irregularly shaped cells with very large air spaces between them thus giving the name, the *spongy parenchyma.* These cells also contain chlorophyll but not so much of it. It is through the upper part of this layer of tissue that the veins of the leaf pass.

Now on the surface of the lower part of the leaf there are numerous little openings, connecting the air spaces between the cells with the air outside. These openings are called *Stomata* or mouths. Each stomata opens into a large intercellular space in the spongy tissue immediately within it, this space being called the air chamber. These air chambers are in direct communication with all the intercellular spaces of the leaf and through them with those of the whole plant. The stomata have the power of opening and closing. As a rule they open under the influence of light and warmth and close when it is dark or cold. By means of these stomata the air containing Carbon dioxide is admitted to the interior of the leaf, and reaches the palisade cells, where it is acted upon by the chlorophyll under the influence of sunshine and the carbon dioxide decomposed. The water and minerals are carried to the same cells and the foods elaborated, starch, sugar, &c., are carried away along the veins. Hence each leaf is really a wonderfully complete factory with a perfect air and water supply, and special arrangements for a steady supply of the raw material to be worked upon, and for the removal of the manufactured products.

The network of veins in a leaf has been appropriately compared to the system of irrigation channels in a field. In sunlight the leaves are constantly transpiring water, which evaporates from them. This water passes in the form of vapour through the stomata. and comes from the intercellular spaces into which it is given out by the cells of the spongy tissue. As transpiration goes on these cells become gradually poorer in water and they make good their loss by taking up fresh supplies from the nearest vein, which is in direct communication with the roots and root hairs which are absorbing water from the soil. By this process of continual transpiration or evaporation the plant obtains the mineral matter dissolved in the soil water for its use.

We have seen that light is necessary to supply the energy for the chlorophyll to decompose the carbon dioxide of the air. This explains why plants cannot grow in the dark. Under shade as the light gets less and less fewer and fewer plants are able to grow until a point is reached when there is so little light that no plant can grow. This question of the supply of light has an important bearing upon the distance at which trees should be planted and so on, a subject dealt with in Scientific Officer's Paper No. 79, in the *Planters' Chronicle*, Vol. VI, p. 594.

In tropical and sub-tropical regions where no rain falls for many weeks at a time, transpiration of water must be checked and so many of the trees drop all their leaves, and remain with bare branches apparently leafless. As soon as rain comes new leaves are put out and the normal processes of transpiration and assimilation are resumed. The danger of transpiration during continued dryness of the soil is obvious and the fall of the leaf and the consequent stoppage of the flow of the sap furnishes one of the best protective measures that plants can adopt against excessive transpiration and withering.

The detachment of the leaves is brought about by the formation of a special layer of cells at the base of the leaf stalk, and before the leaf falls most of the food stored in it is withdrawn so that the dead leaf only contains waste products the chief of which is Lime. Some Potash salts are also found in it, a little Phosphoric Acid and a little Nitrogen and these are returned to the soil when the fallen leaves rot to be used again by plants, so that the mulch of dead leaves has a manurial value as well as a physical effect on the soil.

Thus Dr. Lehmann found that the fallen leaves of twelve different trees commonly used as shade for Coffee in Mysore State contained on the average 1·01% of Nitrogen, 0·16% of Phosphoric Acid and 4·14% of Lime.

RUDOLPH D. ANSTEAD,
Planting Expert.

THE INDIAN TEA ASSOCIATION.

Extracts from Proceedings of the Thirty-First Annual General of the Indian Tea Association, held at Calcutta on Friday, the 16th February, 1912.

THE SCIENTIFIC DEPARTMENT.

In the course of his address presenting the report of the General Committee for the past year the Chairman remarked :—

As regards the Scientific Department, Dr. Hope is here to-day and will presently tell us something of the work done by himself and his colleagues during the past year. We have now, for the first time, a fully equipped staff, as we have recently engaged, through the kind offices of the London Committee, a fully trained mycologist, Mr. A. C. Tunstall, B. Sc., as also a successor to Mr. C. B. Antram, our late entomologist, in the person of Mr. E. A. Andrews, B.A. Both these gentlemen come to us with high recommendations and I have no doubt they will soon give a good account of themselves. Dr. Hope and Mr. Carpenter continue to occupy the posts of Chief Scientific Officer and Assistant Scientific Officer, respectively, and their qualifications are too well known to you all to need any special mention by me.

I understand that among the pests and blights which will continue to receive special attention during the coming year are the elusive blister blight so prevalent at times in the Darjeeling district, the mosquito blight with which we are all familiar, and which is specially troublesome in the Dooars and Cachar districts, and the white ant, which does such extensive damage in all districts. It has been usual at this time to take advantage of the presence in Calcutta of the Cess Representatives from the tea districts to consult with them as to the programme of work to be done by the Scientific Department during the next twelve months, but, unfortunately, we have no one from either the Brahmapootra or Surma Valleys with us at this time. The Hon'ble Mr. Skinner and the Hon'ble Mr. Cathcart, the Chairman, respectively, of the Branches concerned, are both, I regret to say, in indifferent health at present and moreover are much occupied with preparations for their early departure for England. I take this opportunity of asking you to join with me in expressing our appreciation of the honour done to the industry by the conferring on the Hon'ble Mr. Cathcart of a C. I. E. Mr. Cathcart has done yeoman service for some years as Planting Representative on the Council of Eastern Bengal and Assam and also as Chairman of the Surma Valley Branch of this Association and we congratulate him on this recognition by Government of his valuable services.

As regards the proposal, referred to by Mr. McMorran in his speech from this chair last year, that the officers of the scientific department should be provided with suitable head-quarters at a common centre, I am glad to say that this has been given effect to. Two commodious bungalows, as also a suitable laboratory, are now in course of erection at Tocklai in the Jorhat district of Assam and they will I trust, be ready for use shortly. These buildings and the necessary tank, etc., will entail a considerable expenditure of money and I do not anticipate that we shall be able to complete them at a much less cost than half a lakh of rupees. This sum will, of course, fall to be provided for out of the funds of the Association and I shall presently move a resolution to the effect that these funds be drawn upon to the extreme names, for this purpose. The arrangement under which the Assistant Scientific Officer, the entomologist and the mycologist are to be located together is one which has met with general approval. It has very undoubted advantages, not the least of which is that when one of the officers mentioned is away on tour his laboratory work can be continued under the supervision of one of the others. It will permit of a greater amount of research work than has hitherto been possible and particularly of such work as demands the attention of two or more of the officers, while at the same time special enquiries may be carried on without breaking the continuity of the routine work of the laboratory.

When called upon to present his report in the working of the Scientific Department, Dr. Hope said:—

Mr. Chairman and Gentlemen,—In making the annual statement of the Scientific Officer with regard to the progress of the scientific department I will first review the work which has been carried out during the past year.

The chief subjects which have engaged attention have been:—

1 The firing of tea
2 The physical properties of tea soil
3 Manurial experiments carried out by managers of gardens
4 The damage caused by the tea seed bug; and
5 the damage in tea chest woods caused by beetles.

The study of the firing of tea has been continued by Mr. Carpenter and myself and we have formed opinions on the subject some of which were referred to briefly on this occasion last year. Our practical conclusions in general are in agreement with those which have been arrived at by other workers in the same field, amongst whom are our immediate predecessors, but on certain points of some importance this is not so. Much further investigation on the theoretical and practical aspects of manufacture generally is necessary before the merits of these opinions can be settled and the problems connected therewith will have our full attention when our new laboratory is equipped.

Investigation of the physical properties of tea soils has been carried out steadily during the past year in the Calcutta laboratory. When a general survey of the tea soils of North-East India has been made from this point of view, it should afford a valuable addition to the chemical studies made by Dr. Mann.

Manurial experiments made by managers of tea gardens have been closely watched throughout the year and a short paper on the subject will appear in the next number of the Quarterly Journal, a publication to which I will refer later. Only one point calls for particular note, and that is the possibility of the application of lime proving to be of greater benefit to tea than was at one time supposed.

The work done by the Imperial mycologist in conjunction with ourselves in connection with the damage to tea seed which is probably caused by the tea seed bug *Poecilocoris latus* was referred to briefly last year. Mr. Antram has devoted some time since then to the study of the life history of this insect, and an article on the subject has recently appeared.

The damage caused by beetles in tea chest woods has engaged the attention of the entomologist and myself during the past year, and a preliminary pamphlet describing the species of insects responsible for the damage and the condition under which their attacks take place has just been published. The subject is perhaps a side issue but it falls, I think, within the sphere of our work. Further enquiries are being made with the object of determining whether any treatment of the wood such as might render it immune to attack be feasible.

Your Chairman has referred briefly to some of the problems which are to be investigated in the immediate future and it only remains for me to say in this connection that I fully understand the importance of devising some means whereby the ravages of mosquito blight, blister blight and white ants may be checked. The draft programme of the work of the current year which I am about to lay before the department Sub-Committee contains arrangements for carrying on our investigations of these matters immediately.

Some time ago it was suggested that a periodical might be issued under the auspices of the scientific department, containing matter, such as is likely to be of general scientific interest to those connected with the tea industry. This suggestion was put into practice a year ago and four numbers of a Quarterly Journal have already appeared. The circulation of this Journal is sufficiently large to indicate that it supplies a want and to justify its continuation.

Another innovation which was sanctioned some time ago is about to be out into force. This is the formation of an analytical department. An additional chemist has recently been appointed, and the scientific department is now in a position to undertake chemical analysis at a scale of charges which will be made as moderate as possible. I hope that this arrangement will enable members of the Association to obtain information with regard to the composition of soils, manures and so on more easily than has hitherto been possible and that it will stimulate interest in those important branches of tea garden work.

———o———

Extracts from Abstract of Proceedings of a Meeting of the General Committee held at Calcutta on February 27, 1912.

Correspondence with the Indian Tea Association, (London).—Letters dated 26th January, and 2nd and 9th February 1912 from the Secretary, Indian Tea Association (London), which had been previously circulated, were now to be recorded. The principal subjects dealt with in these letters were:—

(*a.*) *Ocean Freights.*— . . . .

(*b.*) *Stocks of Tea.*—It was mentioned in the letter of 9th February that in the Board of Trade returns for January the bonded stock of tea in the United Kingdom had been divided and the exact proportion given of (*a*) India, (*b*) Ceylon, (*c*) China, (*d*) other countries; instead of being stated, as formerly, in one total.

Quinine and Malaria.—There was read a letter of 24th February from the Consul General for the Netherlands, forwarding two copies of a booklet entitled "The Value of Quinine in combating Malarial Fever" by the Official of the Netherlands-Indies Association for the promotion of the interest of Cinchona Planters. The booklet was to be circulated for perusal by the Committee.

Scientific Department.—There is printed, as an appendix to these proceedings, a note regarding the Analytical Branch of the Scientific Department, stating the fees which it is proposed to charge for analyses of soils, manures.

APPENDIX.

THE ANALYTICAL BRANCH OF THE SCIENTIFIC DEPARTMENT.

With the appointment of an additional chemist the Scientific Department is in a position to undertake analyses of soils, etc., for members of the Association at the following scale of charges which have been made as moderate as possible.

OILCAKE.	
Nitrogen	Rs. 5
Complete (Nitrogen, total ash & insoluble ash)...	„ 10
SOIL.	
Chemical	„ 40
Mechanical	„ 32
Ordinary Report (Nitrogen, insoluble silica, organic matter, phosphoric acid, Potash) ...	„ 32
Mechanical and Ordinary	„ 60
Complete investigation (Chemical and Mechanical and investigation of bacterial activity) ...	„ 75
MANURES.	
Percentage of phosphoric acid, Potash, Nitrogen..	„ 5 per estimation.

Analyses of other substances such as lubricating oils, coal, paints, etc., are undertaken and a scale of charges may be obtained on application to the Analytical Officer.

All analyses will be carried out under the direct supervision of one of the European Officers of the department and reports of analyses will be signed by him.

The Analytical laboratory is situated at the Association's Experimental Station in Assam and all samples and correspondence relating thereto should be directed as follows :—

The Analytical Officer,
The Tocklai Experimental Station,
Cinnamara P. O.,
ASSAM.

The officers of the department hope that this arrangement will enable tea planters to obtain information with regard to the composition of their soils, manures, etc., more easily than has hitherto been possible and that it will stimulate interest in this impottant branch of their work.

THE TEA TRADE.

Imports of tea during January were 5 million lbs. larger than in January, 1911, and the total stocks on the 31st were much augmented, being over 135½ million lbs., compared with nearly 125 million lbs. in 1911, 134⅓ million lbs. in 1910. The large addition to the stock is attributed to the increased quanity held in private warehouses. The market of late has had an improved tone, as the quantities coming forward are not large, having undergone a decided reduction. Common blackish Indian leaf is worth 7¾*d.*, which is about the same quotation as at this time last year. These prices are lower ; this circumstance is due to the increased quantity of rough and stalky teas from India recently offering. Despite the heavy quantity of plain tea still on the market, values have not given way ; on the contrary a firmer tendency has been latterly observable, particularly for good liquoring sorts. The autumnal invoices which have arrived from India have not been up to the average standard. The anticipations of increased production in Ceylon have not been realised, the yield there being checked by cold weather ; quality of the offerings, however, should shortly show decided improvement. Imports from Java during January increased by over 2 million lbs., and have exercised a steadying influence upon the value of low medium grades generally. The outlook from the producer's point of view appears favourable, but with common tea remaining dear prospects for distributors cannot be regarded as encouraging.—*The Grocer.*

INDIAN TEA CESS COMMITTEE.

Advertising in America—1911-12.

MEMO.:—The following report by Mr. R. Blechynden, the representative of the Indian Tea Cess Committee in the United States, upon the work done during the third quarter of the season 1911-12, is published for general information:—

INDIAN TEA AMERICAN ADVERTISING FUND.

Season 1911-12.

REPORT FOR THIRD QUARTER.

I beg to submit my report for the months of October, November and December 1911.

NEWSPAPERS.

2. At the end of the second quarter all newspaper advertising was concentrated in the State of Iowa. Additions were continuously made to the list of papers we were using, so that by the end of the third quarter we had used substantially all the daily newspapers published in that State.

3. Full details as to the form of the advertisement we use have been given in previous reports, so that further description is needless. Whole pages taken from the newspapers we used, showing the advertisements are, as usual, attached to this report.

4. Newspapers advertising, with all other work, was suspended in the middle of December as from that time to the close of the year consumers as well as the trade are too absorbed in other things.

SPECIALTY MEN.

5. Three men were employed throughout this quarter, but ceased working about the middle of December, as grocers will not give attention to specialty men while the Christmas trade is active.

6. The three men reported 330 sales of 9,400 lbs. of tea, an average of about 28½ lbs. This average is about the same as in the previous quarter, but the sales were fewer owing partly to the loss of two full weeks in December and partly to the setting in of severe winter which made travelling through the country districts very arduous.

7. At the close of the quarter we had very thoroughly covered the area mapped out, with the exception of those parts of Nebraska which border the State of Iowa and form part of the territory.

POST CARDS AND SAMPLES.

8. Advertising matter was sent out regularly till about the middle of December, after that time mails are overloaded and such matter is not carefully handled.

The following is the record for the third quarter, compared with those of the two previous quarters:—

Months.	Post cards.	Samples.	Total.
October	22,085	7,192	29,277
November	13,583	7,115	20,698
December	13,559	1,014	14,573
Total ...	49,227	15,321	54,548
Second quarter ...	63,507	18,354	81,861
First quarter	68,451	22,846	98,227
	181,185	56,521	237,706

Third quarter, mailing lists ...	271	Names	15,321	Average	56	Names.
Second ,, ,, ,, ...	253	,,	18,354	,,	72	,,
First ,, ,, ,, ...	414	,,	22,846	,,	55	,,
Total three quarters ...	958		56,521		183	

9. Post cards from Calcutta continued to arrive during this quarter, but their number is not recorded here as they are posted in Calcutta and arrive here about one month later.

10. We have had to hold back quite a number of post cards and samples which in the ordinary course would have been despatched as the weather has been unusually cold. During the first three weeks in January the thermometer has for days at a time been about the zero mark and has been down to 14° below zero in St. Louis and many degrees colder in Iowa. At such times ordinary traffic on the railways is dislocated and trains are many hours behind time. In such conditions advertising matter does not get good treatment from overworked and half benumbed officials and rural mail carriers.

I refer here to this as the advertising matter still in hand should properly appear in the figures for the third quarter.

DELIVERIES.

11. The jobbers reported 355 deliveries of about 20 lbs. As mentioned in my last report, each delivery represents a decorated canister of suitable capacity lettered with the words India tea. These form a lasting advertisement on the grocers' shelves.

GENERAL.

12. The quarter has been a troubled one for the tea trade generally. In my last report I alluded to the situation caused by the enforcement of the new regulations affecting green teas imported into this country. These regulations were framed under the special act known as the Tea Act and their intent was to exclude all coloured teas without distinction. Owing to defects in the selection of the standards which are used by the tea examiners for purposes of camparison, some China green tea was admitted though now known to contain artificial colouring. One section of the trade is desirous of such tea being excluded while another section is in favour of its admission. The result has been appeals and counter appeals; issue of new rules laying down chemical formula to be used in doubtful cases and claims that the formula is inadequate. Appeals have been carried to the President and the question remains undecided. The consequence of this uncertainty as to supplies has checked active tea buying although it is generally realized that there are short supplies this season and conditions in China make it questionable whether a full supply will come from that country next season.

The immediate result has been an increased demand for Japan tea, as producers in that country have complied with the United States requirements and Japan green tea is being sold as a substitute for China greens. India tea and generally all black teas will benefit under present conditions and will gain largely in the end. Our work during the season has been very opportune as we have been paving the way for the trade to offer black teas in territory where it previously had no chance.

In the course of a letter to the *Grocer*, Mr. P. Lawrence, Secretary to the China Tea Association; observes:—

"One of the largest firms of wholesale tea dealers in London . . . write in their last annual report:—'There is evidence that the campaign so skilfully conducted in favour of a reversion to China tea is having the effect of increasing the consumption of choice high-priced grades.' " . . .

RUBBER

Rubber in 1911.

Though "drought" caused some reduction of supply during the early summer, the total imports of plantation rubber are satisfactory, write Messrs. Figgis. The general quality and preparation have been excellent, though bad water on some estates has accounted for rubber of poor colour. The readiness to sell at market values, whilst Brazil attempted to hold up prices, and the quickness with which plantation rubber can be used by manufacturers, have produced a phenomenal demand and consumption for it. Our monthly tables of imports, deliveries and stocks show deliveries regular and as large as the greatly increased import. This is the safe basis for planters to work on, and we hope no disastrous boom like last year will tend to upset the safe future sale and good demand for plantation which we anticipate to continue. We estimate 850,000 acres under rubber cultivation in the East—part of this will no doubt revert to jungle again—but it is wise to remember that of the probably 100 million trees, not 15 per cent. have been tapped yet. Probably 100,000 acres are Castilloa and Rambong. New planting has not been so rampant, as the ridiculous boom of 1910 has not induced new enterprise. As we anticipated, more business has been done this year for forward delivery or shipment, many companies wisely securing sales at a satisfactory profit of a good portion of their output. This also has greatly increased the sale and demand for plantation. There has been a decline in the supply of many wild medium rubbers; Guayule, mainly used in America and Germany, decreased to 9,200 tons. The manufacture of "reclaimed" rubber has been enormous. We recommend most estates to prepare rubber in crepe form and cannot too largely urge that, whether crepe or sheet, rubber be packed loose and dry, flat, in lengths of the cases, not turned over or twisted. Rubber should not arrive mouldy and damp, and so not be tenderable as "fair-average quality." We repeat last year's advice to planters to wash and clean the rubber thoroughly and to prepare as large a proportion as possible of good colour; also not to send many qualities or very small lots. Any lots of under 4 cwts. are to be sold by auction as "star lots" at the conclusion of the sales. Block —Only clean resilient hard quality is liked: it is better to ship as crepe or sheet. Pack in strong cases of 2 cwts. to 3 cwts. each. No paper, fuller's earth &c to be used. "Cotton" adhering to the rubber from the presses is very prejudicial to its sale and value. The cases should be planed smooth inside, to avoid small pieces of wood adhering to the rubber.

We suggested in our last annual circular that estates should standardise their qualities and try to send No. 1 Latex pale, No. 2 light brown and grey, No. 3 (from bark scrap) dark and brown; very common pieces and scrap can be sent in one bulk for sale on arrival. The supplies from the Amazonas show little decline, although Brazil merchants suffered so seriously from last year's extravagant boom of prices. The extracted rubber from "Jelutong" has much declined in quantity, but recently the quality greatly improved. Shipments of raw Jelutong, about 34,000 tons; over two-thirds to America. Rambong has been in very good demand at high prices for clean dry lots but Castilloa sold cheaply and was too soft.

The world's supply of rubber was about 76,000 tons in 1911 (with Guayule &c., 88,000 tons). Consumption took nearly the whole and we close with moderate stocks. The great extension of motor vehicles has been the chief cause of the large consumption of rubber, and the unusual heat of the last fine summer, not only aided in this, but caused a much more rapid wear of tyres and consequent replacement. In America where they had largely over-manufactured last year, the demand has mostly cleared the old stocks and they have purchased rubber freely the last four months, manufacturers being very busy again. Last January good sheet sold at 5*s.* 5*d.* closing at 4*s.* 11*d*; smoked 5*s.* 11*d.*, closing value 4s. 11½*d.*; pale crepe at 5*s.* 6*d.*, closing now value 4*s.* 11½*d.*

RUBBER PLANTATIONS.

	1908. acres.	1909. acres.	1910. acres.	1911. acres.
Ceylon ...	180,000	187,000	200,000	210,000
Malaya, Malacca (about 40 million trees, not 12 million tapped in 1911) ...	185,000	240,000	290,000	350,000
Borneo ...	10,000	10,000	12,000	20,000
Dutch East Indies (Java 110,000; Sumatra 80,000) etc. ...	90,000	120,000	185,000	200,000
India and Burmah ...	30,000	31,000	30,000	40,000
German Colonies, Samoa (2,000) East and West Africa ...	...	38,000	45,000	45,000

Mexico, Nicaragua, and Honduras have probably planted 80,000 acres, mostly Castilloa; also Colombia, Ecuador, Bolivia, and Peru. India is extending. More in Burmah and Mergui; the Philippines (small as yet), Samao, Hawaii, other islands, and New guinea, Queensland, small, and Seychelles little. The East and West Coast of Africa have plantations; some also in Congo region and German West Africa; also in British East Africa, Uganda, and the West Indies (probably 5,000 acres). Brazil, Bolivia and Peru exported in 1911 39,500 tons, in 1910 40,500, 42,000 tons in 1909, 40,000 tons in 1908, 41,500 tons in 1907. Manicoba, fair supply. Guayule, from Mexico, largely used in America and the Continent, decreased to about 9,200 tons.

From Brazil, Amazonas, Bolivian, Peruvian, and (*Wild*) *Medium Rubber*:—The consumption has been larger than ever, and the trade very active, especially during the last four months. Nearly the whole of the supplies of rubber have been consumed—probably 74,000 tons rubber, to which must be added some 10,000 tons Guayule, and the enormous quantities used of reclaimed rubbers. Fluctuations in prices were frequent and considerable, but not so violent the last half of the year. Europe has been busy throughout and the fine summer caused a much increased demand for "tyres." America has been very busy since August. Financial difficulties of holders forced the price of fine hard drawn to 3*s.* 10*d.* and the purchase by a syndicate in Brazil of about 3,000 tons to maintain prices has not resulted successfully and this is held in Brazil. Many importers and holders have suffered seriously from the extravagant "boom" of last year, and the supply of eastern plantation rapidly increased, and importers sell at once, of which Brazil must take note.—*Economist.*

Hevea in Java.

Java still appears to be in a doubtful state with regard to the cultivation of *Hevea brasiliensis.* It is said that during the last few years, and especially when boom conditions were prevailing, Dutch planters and merchants owning worn-out coffee estates took full advantage of the opportunity to sell, sometimes at fabulous prices, their estates to British companies. It was sometimes sufficient if the estate possessed a large enough number of Hevea trees of a specified age the condition of the soil or the over-planted or weedy state of the property not being taken into consideration. While these criticisms admittedly apply to many Java Companies registered in Great Britain, it is obvious that they do not hold good for others which by their crops and dividends have already proved their general soundness. In fact the poor show made by some Hevea estates in Java can be attributed to quite other causes than those mentioned above.

One of the most important points to be borne in mind in connection with Hevea in Java is that there are very few planters in that land who possess a thorough practical knowledge of the systems of tapping in vogue in other countries, the yield of rubber obtainable per coolie per day, or the up-to-date methods of coagulating, washing, drying and packing. What knowledge the planters in general possess is largely of a theoretical character and has rarely been acquired by actual work on the plantations of Java. The few good Hevea planters in that land have more work before them than they can possibly undertake; for this lack in number investors in this country must necessarily suffer.

It may be reasonably asserted that this phase must have been passed through in Malaya, Ceylon and Sumatra and that matters will right themselves in course of time. While admitting that this view is partially correct we must say that the transitional stage from apathy to alert efficiency was by no means so drawn out in other countries as it promises to be in Java; and it was not accompanied by that frequent change of management which has been so noticeable of late in Java. What, then, is the cause of this slackness? One of the reasons why better yields have not been obtained is because the present-day Hevea manager finds it difficult to forget his doleful experiences with Castilloa and Rambong. The loss in hard cash and labour in connection with these rubber trees in Java had been great; and many Hevea estate managers to-day are lacking in confidence. Many of them do not really believe in the success of Hevea rubber.

And some of them are apparently not very keen on being taught how to make Hevea a success. We are aware that these are somewhat strong remarks for one who is connected with Java estates to make. Judging estate affairs from the British standpoint one cannot help being struck by the lack of details in accounts, and enthusiasm in general progress of Hevea cultivation on many estates. Perhaps it is prejudice coming to light in the form of stubbornness: It might well be that the Ceylon and Malayan systems of accounts and general management are not always understood in Java. Certainly the value of discipline does not appear to be appreciated so highly in Java as even in the sister colony—Sumatra. Without confidence in Hevea, without a thorough grasp of tapping methods and the preparation of rubber, or in the absence of enthusiasm and discipline among the staff, Hevea cannot be made the success in Java which it has been in adjacent colonies.

Probably one of the reasons why Hevea yields have not been what they ought to have been in Java, is that the commission basis, when applied to Hevea as against robusta coffee and sugar, is not so attractive to the estate manager and staff. There is a longer wait for crops and the amount of commission received even when Hevea trees commence yielding is not particularly great. It is quite common for Java managers to receive a commission of 10 per cent. of the profits from coffee, or cash for every picul of coffee harvested. Robusta coffee being such a heavy yielder and cropping so early is preferred to Hevea, in areas where the latter requires six years before tapping can be commenced. As a result of this, instances are known where managers have deliberately allowed the coffee to seriously interfere with the Hevea trees to such an extent that tapping has been delayed for quite a couple of years despite instructions from directors in Europe to regard Hevea as the important and principal crop.

It may be suggested that one way out of the difficulty would be to pay commission for Hevea trees of a given girth, as is done by the Brazilian authorities to encourage the permanent cultivation of Hevea trees. The suggestion though flavouring of absurdity does, however, indicate the necessity of radical changes on Hevea estates.

The difficulties experienced by most English companies owning estates in Java will probably be overcome by the introduction of better supervision by visiting agents drawn from Dutch planters who have a thorough grasp of the methods adopted in Malaya and Sumatra. The majority of managers require all the practical assistance possible and will, in our opinion, soon realise that in *Hevea brasiliensis* they have a tree which for hardiness and yielding capacity cannot be equalled by any other plant in the tropical world. There is money to be made with Hevea in Java for managers as well as shareholders. There are thousands of acres in that island which can grow Hevea as well as, if not better, than Klang, Langkat or Kalutara. There is a labour force to draw upon which other countries find useful, and it should not be difficult to encourage the growth of a resident tapping force by the payment of premiums according to the length of tapping servire rendered. In our opinion, English Companies operating in Java should have their shares at a much higher value than they are to-day. Instead of the few, such as Bendjasarie, Java Rubber Plantations, Simo and Java Amalgamated, standing at a premium, there should be a score of companies showing a considerable capital appreciation at the present time.—*India-Rubber Journal.*

The Question of Quality in First Latex Contracts.

This question has been causing much discussion in Mincing Lane, and it has been felt by many of the dealers that a good deal of rubber has been passed as first latex the quality of which is open to grave question.

Perhaps the greatest amount of discussion has raged over the question of unsmoked sheets. Until recently this grade has been divided into two qualities.

1. Fair average quality, which was clean, even strong rubber, not stuck, and without any trace of mould, damp or virgin.
2. Rough off sheets, consisting of stuck, mouldy, resinous, or virgin sheets, which, however useful they might be to manufacturers for certain purposes, could not possibly be classed as fair average quality.

Of late there has been a tendency on the part of the arbitration committee to pass the second grades of sheet as fair average quality. In a lesser degree this is true of first latex crepe, where parcels of stained, spotted or scrappy rubber have been passed as first latex.

This gradual lowering of the standard of first latex rubber is much to be deplored on every ground.

It is prejudicial to the interests of both producer and consumer; to the former because it gives the careless estate manager an opportunity of getting as good a price for badly prepared rubber as for that which is well prepared; to the latter because he will not be able to rely on the quality of the plantation rubber when he buys for forward delivery.

Plantation rubber is a great and increasing industry and it is by encouraging the estates to produce rubber of the very highest standard that its use will spread more and more among manufacturers.

Anything that tends in ever so slight a degree to lower the standard will be fatal to the industry and is much to be regretted, and it is to be hoped in the interests of all that every encouragement will be given to those estates which produce the finest quality of rubber.

This can only be done by rigidly adhering to a high standard of quality, and it is to be hoped that any attempts to pass the off-grades of rubber as first latex will meet with failure. These off-grades of rubber do not give the same results in manufacture as the highest grades and it is in the interests of all concerned that the manufacturers should always be able to rely on receiving what they have bought.

In this connection it is pleasing to be able to chronicle that the arbitration committee has at last recognised the importance of this matter and has consulted with the trade upon the advisability of fixing a more definite standard in future.—*India-Rubber Journal.*

In Formosa.

Permission was granted last year to a Japanese syndicate to form a rubber plantation, and some 3,500 acres of waste land in Kagi Prefecture were leased for this purpose. Central American rubber (*Castilloa elastica*), Ceará rubber (*Manihot Glaziovii*), Pará rubber (*Hevea brasiliensis*), Assam rubber (*Ficus elastica*) trees are to be planted, together with bananas, pine apples, and lemon trees, while plantations of other trees will be made to protect the more valuable trees from wind and against fire. It is expected that the undertaking will be completed in six years.

The Government horticultural nurseries near Kagi are raising large numbers of the above-named trees in a plantation of 25 acres for distribution to the peasants, who will be encouraged to plant them and taught their proper management.

In British East Africa.

The annual report of the East Africa Protectorate states that the exports of rubber have beaten all previous records, and amounted to £30,903 (1,672 cwts.) as compared with £22.544 (1.582 cwts.) in 1909-10. The quantitative expansion of 6 per cent. in conjunction with a 35 per cent. rise in value means an increase of 29 per cent. rise in specific value. Here, as elsewhere, the cultivation of rubber continues to excite a good deal of attention. The principal purchasers of rubber are the United Kingdom (£18,128) and Germany (£9,703).

Rubber School in London.

We are glad to learn that the practical classes and lectures on rubber, chemistry and analysis, which are being conducted by Mr. Frederick Kaye, at the Northern Polytechnic Institute, Holloway, N., continue to make good progress. The number of students now enrolled has reached 38. We are much interested to find that nearly every student is actually engaged in, or is connected with some branch of the rubber industry.

The students can be divided into three groups as far as their relation to the practical rubber activities: –

(*a*) Young men who are intending shortly to proceed to Ceylon or Malaya to take up appointments on plantations.

(*b*) Men engaged in marketing raw rubber in London, as in rubber brokers' offices or in offices of plantation companies.

(*c*) Men interested in the manufacture of rubber goods in the rubber warehouses and factories of the city.

The first part of the course was devoted to the study of the production of raw rubber, and to the analysis and valuation of the commercial article. . . . Next year, with further and fuller equipment which is contemplated the students will be able to more thoroughly follow any line of work and investigation that appeals to their scientific and commercial interests.—*India-Rubber Journal.*

SELECTED CUTTINGS.

Agriculture in Bolivia.

The following information respecting the cultivation of coffee, cacao, and the sugar-cane in Bolivia has been extracted by the British Vice-Consul at La Paz from the *Boletin de la Officina Nacional de Estadistica*:—

The most fertile region of the Republic of Bolivia is the north-east and north-west, including a great part of the Department of La Paz, some portion of Chuquisaca and the Department of Cochabamba, Santa Cruz, and Beni. This region includes the mountainous zone and also that of the plants. In the mountainous zone, cut by deep valleys, the perpetual snow line is at 5,000 metres. The region between 2,500 and 5,000 metres in height is called the 'puna,' and produces very little. Valleys are met with between 1,600 and 2,500 metres high, and the Yungas that is, the slopes of the Cordillera Real where the tributary rivers of the Amazon spring forth, lies between 800 and 1,600 metres high. In the valleys and in the Yungas, coffee, cacao, and the sugar-cane are cultivated.

The centre of coffee cultivation is the Yungas provinces of the La Paz Department, and the coffee grown there is generally considered to be the best in quality. The province of Apolobamba of the same Department, and the provinces of Sara, Velasca, Chiquitos, and the Cordillera, of the Department of Santa Cruz, produce a good second class coffee. The product is also cultivated in the Department of Chuquisaca, but on a very small scale. The production of the Yungas provinces of La Paz, which is relatively small at present, could be considerably increased, but the cultivation of cacao appears to be more in favour with the agriculturists of this region. Coffee is exported, Chile and the Argentine being the principal countries of destination.

The production of cacao is much less than that of coffee. It is chiefly cultivated in the Department of Santa Cruz, although even there conditions are such that the production could be increased. The best quality of cacao is that grown in the province of Apolobamba in the Department of La Paz. This cacao is much appreciated by local connoisseurs, and is known under the name of 'Pepita de Misiones' or 'Cocoa of Cavinas,' from the Franciscan Mission, no longer existing, where it was cultivated. From this spot, which was on the left bank of the navigable river Madidi. all the region became abundantly supplied with cacao plants, some widely disseminated and others in large groups, which continue up to the banks of the river Madre de Dios. Being so widely spread and in such vast quantities, it is in thought that the production of cacao is one of the most promising future industries of Bolivia.

The cultivation of the sugar-cane is carried on in the Department of Santa Cruz, where abundant quantities are produced, principally in the provinces of Velasco, Chiquitos, Cordillera, and Vallegrande. Only a part of this production is used in the manufacture of sugar, which, notwithstanding its good quality, cannot compete with foreign imported sugar in other parts of the country, as it is handicapped too severely by the cost of transport in the interior of the Republic.

The sugar-cane is also cultivated to a certain extent in the province of Azero of the Department of Chuquisaca, the Yungas of the La Paz Department, and in the provinces of Mizque, Totora and Chaparé of the Department of Cochabamba. All this production is employed in the manufacture of spirits and molasses (From the Board of Trade Journal, November 23rd, 1911, p. 380.)—*Agricultural News*.

The Quantity of Sulphur in Soils.

The *Agricultural News* of August 5, 1911, contained an editorial article which pointed out that the importance of sulphur in the life of the plant had been under-estimated, chiefly because the methods of analysis commonly employed do not serve for the detection of the whole of the quantity of that element that is present; certain proportions are lost during the manipulations concerned in the investigations, and are therefore not accounted for in giving the results.

The matter obtains further attention in an article by P. de Sornay, Assistant Director of the Station Agronomique, Mauritius, in the *International Sugar Journal* for September 1911, which describes work devised to show that the method that is used for ascertaining the quantity of sulphur, as sulphuric acid, in soils, does not succeed in presenting a true idea of the proportion of the element that is present.

It is first pointed out that, in Mauritius, certain varieties of sugar-cane take up a greater amount of sulphuric acid than of phosphoric acid, from the soil; while in Hawaii the contrary condition obtains. In both cases, the sulphuric acid content of the leaves is about the same. Analyses of rain-water in Mauritius have shown that this contains an amount of sulphuric acid that serves to supply over 50 lb. of sulphuric acid—equivalent to more than four times as much sodium sulphate—per acre; so that rain is a by no means unimportant source of the sulphur required by the cane. Humus contains a proportion of sulphur which becomes useful to plants by being oxidized to sulphates, in which form it is absorbed. The special usefulness of the element formation of the important nitrogenous bodies known as albuminoids.

In methods for estimating sulphur in soils which entail the use of concentrated nitric acid as a first step, the presence of iron and aluminium in high proportions is sufficient to prevent the sulphur compounds from being completely dissolved, so that they are not detected subsequently. When hydrochloric acid is used, the preliminary solution is more efficient, owing to the greater solubility of iron and the aluminium in that acid. That this condition obtains in practice was shown by extracting a sample of soil with nitric acid, and treating the insoluble residue with hydrochloric acid, when in all cases it was demonstrated that the employment of nitric acid had not been sufficient for the solution of the sulphur. Further, calcination always gave still higher figures for the sulphur content of the soil, because it causes the oxidation of the organic sulphur that is present and, in addition, assists in the dissolving action of the acids that are employed subsequently. There are losses, however, even when calcination is used, for the carbon present causes reduction to sulphides, which are driven oft by heat, and the high temperature is also sufficient to cause volatilization of the sulphur contained in some of the organic matter in the soil, before this can become oxidized, and fixed. The researches of the author have led to the adoption of a method of determining sulphur in soils, in which the efficiency of calcination is increased by mixing with potassium nitrate the samples taken, before they are heated, so that complete oxidation to sulphate is obtained. Cases have been found, however, in which the use of potassium nitrate in this way did not result in the detection of sulphur in greater amounts than those given when it was employed, and these occurred chiefly in regard to examples that did not possess a high humus content.

The advice finally given in regard to the matter is that, for the determination of sulphur in soils, calcination should be carried out after the addition of potassium nitrate, and that extraction of the calcined mass should be effected with hydrochloric acid. Details are presented of the maniputation required in the adoption of this method.—*Agricultural News.*

The Planters' Chronicle.

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Scientific Officer's Papers.

XCV.—FISH MANURE.

During the last few months I have had many enquiries about Fish and a new form of Fish manure which is called Fish Guano. This is a somewhat unfortunate choice of name, for Guano is strictly speaking the material obtained from old deposits of the excreta of Birds or Bats. However, Fish Guano appears to be an old established name for a high grade form of Fish more or less milled, or ground up and dried.

In the following table will be found a number of analyses of Fish manures of different kinds :—

	1	2	3	4	5	6	7
Moisture ...	15·0	20·32			6·47	3·67	3·66
*Organic Matter ...	—	56·70			66·70	43·11	49·54
*Soluble Mineral Matter ...	—	20·88			25·16	18·58	15·47
Insoluble Mineral Matter ...	—	2·10			1·67	34·64	31·33
	—	100·00	...	...	100·00	100·00	100·00
*Containing Nitrogen ...	8·5	7·35	7·84	9·0	7·96	3·71	5·86
*Containing Phosphoric Acid ...	13·3	8·85	5·92	8·0	10·50	7·03	4·79
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Cost per ton ...	—	—	120	100	100	100	59
Value per ton ...	120·8	93	96	112	102	51	72

In this table the first column gives the figures quoted by Ville for Norwegian Fish Guano from an analysis by Wolff.

The remaining figures relate to Indian samples. No. 2 is an analysis made by Mr. Fawcitt of a sample of Fish Guano received from the West Coast; No. 3 gives the percentage of Nitrogen and Phosphoric Acid in a

sample also from the West Coast; and No. 4 gives the percentage of these constituents guaranteed by a well-known Indian firm in their Fish Guano. Nos. 5 and 6 are analyses recently made in my laboratory of two samples of Fish Guano submitted to me, and No. 7 is the average composition of ordinary Milled Fish extracted from a number of analyses made by Dr. Lehmann.

It will be noted at once that these manures not only differ very much in composition but also in price. When considering the value of a Fish Manure to the planter it must be remembered that all the planter wants to know is how much plant food there is in the manure and nothing else has any value for him. Now in the case of Nitrogen obtained from an organic fertiliser, the cost per unit, or what amounts to the same thing, the cost per pound can be found from the price of poonacs, while the cost of Phosphoric Acid per pound obtained from an organic fertiliser can be calculated from the price of Bones. These prices are given in the following table which shows at a glance how they are obtained:—

	Nitrogen.	Phosphoric Acid.	Price per ton.	Lbs. Nitrogen per ton.	Lbs. Phosphoric Acid per ton.	Price per lb. of Nitrogen & Phosphoric Acid.	
	%	%	Rs.			As.	p.
White Castor Poonac ...	6	—	75	134·4		8	11
Black Castor Poonac ...	5	—	60	112		8	7
Neem Poonac ...	5	—	60	112		8	7
Hoongay Poonac ...	4	—	48	89·6		8	7
Ground Nut Poonac ...	8	—	90	179·2		8	0
Fine Bone Meal ...	4	24·	85	89·6	537·6	1	2
Steamed Bone Meal ...	4	24	80	89·6	537·6	1	0

The cheapest source of Nitrogen is Ground Nut Poonac in which it costs eight annas per pound. In the case of Bones the value of the Nitrogen at eight annas per pound is deducted from the price and then the cost of the Phosphoric Acid per pound is calculated and it appears that in Steamed Bone Meal it costs one anna per pound.

Now turning to the Fish Manure, the value to the planter can easily be calculated. Take the case of No. 5 in the table of analyses as an example. In a ton of this Fish Guano there are, 178·3 lbs. of Nitrogen and 235·2 lbs. of Phosphoric Acid.

178·3 lbs. of Nitrogen at 8 as. per pound ... Rs. 89 2 5
235·2 lbs. of Phosphoric Acid at 1 a. per pound ... Rs. 14 11 2

Value per ton ... Rs. 103 13 7

The price being Rs.100 per ton it is evident from this that the manure is well worth the price.

This, however, is not quite all that has to be taken into consideration because Fish Manures often contain a large amount of insoluble mineral matter, sand derived from the drying grounds &c., and this is not only valueless to the planter but he also has to pay freight on a lot of useless material. Dr. Lehmann several times called attention to this point, and in his Annual Report for 1905-6 he said, "all the samples analysed this year contain an excessively large proportion of sand. The average of the insoluble matter found in the samples analysed some years ago was a little less than 6%. This year's average amounts to more than six times this quantity, 36'56. Such excessive adulteration reduces very materially the value of milled Fish as a manure."

In calculating the value of a manure therefore the percentage of insoluble matter should always be considered. In the example quoted above a ton of the manure contains 37'4 lbs. of this useless material which costs 8½ pies per pound, the cost of the manure per pound (Rs.100 per ton), so that the sum of Rs.1-10-6 must be deducted from the value which makes it Rs.102-3-1 and it is still well worth its price. The case is very different, however, when the percentage of insoluble matter is high, and No. 6 in the table of analyses is an excellent example of a manure which is worth nothing at all. If the value is calculated in the way indicated above the plant food in it will be found to be worth only Rs.51 and in addition a ton contains 775'9 lbs. of insoluble matter which is costing 8½ pies per lb. so that a sum of Rs.34 odd must be deducted making the manure quite valueless.

Finally take the case of ordinary milled Fish the analysis of which is given in the last column of the table.

Here a ton of the manure contains 131 lbs. of Nitrogen and 107 lbs. of Phosphoric Acid, and 702 lbs. of insoluble matter.

131 lbs. of Nitrogen at 8 annas per pound	Rs.65	8	0
107 lbs. of Phosphoric Acid at 1 anna per pound . .	,, 6	11	0
Total Rs...	72	3	0
Deduct 702 lbs. of Insoluble matter at 5 pies per lb.	18	4	6
Value per ton Rs...	53	14	6

The cost of this manure is quoted at Rs.59 per ton which is about Rs.5 per ton in excess of its real value as a fertiliser.

Fish Manures should not contain more than two per cent. of insoluble matter, and when buying, a guarantee of the amount of insoluble matter should be asked for as well as the amount of Nitrogen and Phosphoric Acid, and samples of the manure delivered on the estate should be analysed to check this guarantee. If the manure contains more than 2% of sand the amount should be deducted from the gross weight, and if it exceeds 5 or 6% the price of this amount should be deducted from the price of the manure to compensate for the freight. Not only is the sand useless to the planter but he has to pay freight on it, and with cost of transport often, indeed usually, amounting to at least Rs.15 per ton this becomes a considerable item on the manure bill which should be saved.

In conclusion it appears from the analyses above, and from samples which have been submitted to me, that pure Fish Guanos are on the Indian market, and are a cheap form of fertiliser, but guarantees of insoluble matter should be asked for and the adulteration carefully looked out for.

Planters should always calculate out the value of fertilisers they buy, not only of Fish Manures but all Manures, so as to get an idea of whether they are getting full value for their money, and it is hoped that these few notes may enable them to do so.

RUDOLPH D. ANSTEAD,
Planting Expert.

DISTRICT PLANTERS' ASSOCIATIONS.

Kanan Devan Planters' Association.

Proceedings at the Bi-Annual Meeting of the Kanan Devan Planters' Association, held in the Munnar H. R. Club, on Saturday, 3rd February, 1912.

PRESENT.—Messrs. A. J. Imray, Esq., (in the Chair), W. L. Ranking, C. Fraser, H. Smith, A. J. Wright, W. J. Dixson, J. M. Bridgman.. C. Rowson, W. O. Milne, R. De C. Meade. G. E. Bewley, J. S. B. Wallace, C. E. L. Ward, J. Murray, and E. A. Hughes,. (Honorary Secretary).

By Proxy.—A. W. John.

Visitors.—Dr. James S. Nicholson and Mr. A. Blair Hill.

In opening the Meeting, Mr. Imray announced that it was with great regret he had to inform them of the resignation of the Chairmanship by Mr. H. L. Pinches. He felt certain that all members of the Association would regret that business pressure had caused Mr. H. L. Pinches to come to this decision. In Mr. Pinches the Association had lost a most excellent Chairman who had always taken the greatest interest in the Association's progress and work and by his experience had been of the utmost service to the Association. He was glad to inform them that Mr. Pinches would remain on the Committee and give them the benefit of his advice and assistance as often as he possibly could.

Mr. Fraser proposed and Mr. A. J. Wright seconded, that Mr. A. J. Imray be elected Chairman. This was carried *nem. con.* Mr. Imray, in accepting, thanked the Association for the honour they had done him. Mr. Hughes proposed that Mr. Fraser be elected Vice-Chairman. This was seconded by Mr. Bridgman and carried unanimously.

The Minutes of the previous Annual Meeting having been printed and circulated, were taken as read and confirmed.

The Chairman proposed a very hearty vote of thanks to Mr. Pinches for his work as Chairman. This was carried unanimously.

The Chairman having decided that the heads of the Medical, Transport and Engineering Departments were eligible for election as Members, the Chairman proposed "that Dr. Nicholson and Messrs. A. Blair Hill and G. W. Cole be elected members of the Association." This was carried unanimously.

Sri Mulam Delegate.—The Chairman informed the Association that Mr. A. J. Wright, had been selected as their Delegate to attend the Sri Mulam Assembly, and that he had been instructed to place the matter of the state of the roads before the Government as strongly as possible.

He was also asked, if the matter of Game Laws was brought up, to help the matter forward as much as he possibly could. Mr. Wright thanked the Association for the honour they had done him and promised to do his utmost in their interests.

The matter of Game Laws was then brought up and it was felt by every one that there was very urgent need for their immediate improvement, Mr. Bridgman stated he had received no reply to his letter of 21st December, 1910, enclosing the copies of the letters of men in the District giving their views and opinions on the proposed Game Laws which he had received from Government and which has been sent by him in reply. After some discussion it was proposed by Mr. Fraser: "that the Association regrets that no notice had been taken by the Chief Secretary to Government of the Honorary Secretary's letter of 21st November, 1910, with enclosures, replying to the notice he had received of the proposed Game Laws and that this Association has the honour to request that the Chief Secretary will give this matter his interested and immediate attention." This was seconded by Mr. Dixson and carried unanimously. Mr. Bridgman proposed: "that a new Game Committee be elected to go into the whole matter and place their proposals before the General Annual Meeting to be held in May. The Committee to consist of Messrs. E. E. Williams, A. W. John, M. C. Koechlin, W. J. Dixson, C. Fraser and John Carless. This was seconded by Mr. Bewley and carried *nem. con.*

Post Offices.—The matter of the working of the District Post Offices was then brought up. The Honorary Secretary read the letter No. 14399, from the Superintendent of Post Offices, Madura, in which he informed the Association that the Government has decided to abolish the 2nd despatch from Munnar to Bodinayakanur. Several members complained very strongly of the delay that occurred in the receipt and despatch of their letters, parcels, etc., etc. It was pointed out that a letter sent from Munnar to Chittavurrai and *vice versâ*, a distance of 16 miles, took 56 hours in delivery ! ! It was felt that very marked improvement in the working of the Post Offices was urgently called for. After some discussion, Mr. Wright proposed: " that the Postmaster-General be addressed on the whole subject of Post Office arrangements of the District, with particular reference to the letter No. 14399 of 21st January, 1912, from the Superintendent of Post Offices, Madura, in which it is decided to discontinue the 2nd despatch from Munnar to Bodinayakanur, pointing out that the lack of support complained of arises solely from the alterations recently made in the whole of the arrangements for receipt and despatch of Postal matter at the Munnar Office. Further that this Association protests most emphatically against any further curtailment of the Postal facilities of the District which it represents." This was seconded by Mr. Fraser and carried unanimously. Mr. Fraser proposed: " that the Honorary Secretary be requested to circularise all members with a view to collecting existing specific grievances against the present Post Office arrangements." This was seconded by Mr. Bewley and carried unanimously.

The Lady Ampthill Nurses' Institute.—The Honorary Secretary informed the Meeting that he received a letter from the Honorary Secretary of the institution, informing him that their subscription not only entitled Members, but also their Wives and Families, to the benefits of the institution. Recorded with satisfaction.

Scientific Officer.—This matter was then brought up for discussion, and it was generally felt that the District would benefit by his services. Previously there had been a Scientific Officer resident in the District. At present it was a question of expense. The Honorary Secretary was asked to write and find out from the Secretary of the U. P. A. S. I. what it would cost to obtain the benefit of Mr. Anstead's services. In the meantime the matter be held over until the Annual Meeting, for decision.

U. P. A. S. I.—The Secretary's circular No. 68/1911, giving the financial position of his Association, was read and after some discussion the Honorary Secretary was instructed to pay the amount asked for from the K. D. P. A. (Rs.417.) It was to be pointed out that this payment was to enable the U. P. A. S. I. to tide over the present difficulties and was not to be considered as an annual increase of subscription. This question to be decided at the Annual Meeting.

Accounts.—A statement was laid on the table and considered satisfactory.

A vote of thanks to the Honorary Secretary was proposed by the Chair and carried unanimously.

A vote of thanks to the Chair terminated the Proceedings.

Papers on the table.—U. P. A. S. I. Circulars, Indian Tea Association Circulars, Letters, etc., etc.

(Signed) A. J. IMRAY,
Chairman.

(Signed) ERNEST A. HUGHES,
Honorary Secretary.

Wynaad Planters' Association.

Proceedings of a Meeting held at Meppadi Club on March 6th, 1912.

PRESENT.—Messrs. Atzenwiler, Darken, Egan, Gillatt, Powell, and C. E. Abbott, Honorary Secretary.

1753. *The Proceedings of the last meeting* were confirmed.

1754. *Election of New Member.*—Mr. C. L. Egan was elected.

1755. *Roads. Achoor.*—Read Honorary Secretary's letter to District Board Engineer, and his reply stating that it is proposed to spend Rs.300 on first mile of this road, that the next 5 miles are to be maintained by the E. I. T. P. Company, and that Rs.825 will be spent on the next 13 miles to Taravand, including 300 on bridges.

Vellera Mulla Road.—Read letter from Assistant Engineer. Noted. It is hoped that the bridge at mile 2/3 will soon be put in order.

1756. *Labour Advertisements.*—Members who require these advertisements in any South Indian vernacular should apply as soon as possible to the Secretary, U. P. A. S. I. Mr. A. Ff. Martin's Calendar was exhibited in the room.

1757. *Land Settlement.*—Read correspondence with Honorary Secretary, Nilgiri Planters' Association. Read also letter from Mr. Waddington. It was decided to leave this matter alone as far as Wynaad is concerned. The question of Jenmi titles in the low country can be discussed later.

1758. *Green Tea Bonus.*—Read telegram from Mr. J. Carson Parker, and U. P. A. S. I. circular. The Meeting congratulated Mr. Parker.

1759. *Poodupady Hotel.*—Read correspondence. Honorary Secretary was authorised to pay C. Chungaren Rs.50 now for repairs, and a further Rs.25 later.

1760. *Ceará Tapping.*—A letter from Mr. Anstead was read with much interest.

1761. *S. I. P. Benevolent Fund.*—Attention was again drawn to this. Three more members have joined. Members wishing to join are requested to notify the Honorary Secretary.

1762. *Medical.*—Resolved that the Association offer to pay Mr. Stewart the expenses he has incurred in connection with the scheme.

1763. *U. P. A. S. I. Exhibition.*—Resolved that the Association support this. Members are asked to contribute.

1764. *Local Vakil.*—Read letter from Mr. A. R. Subramania Iyer suggesting that his son, Mr. A. R. Daramraja Iyer, be appointed by the Association to conduct Members' cases under the Madras Planters' Labour Law in the Vayitri Magistrate's Court. The Association has no power to make such an appointment. But this paragraph is printed for information.

1765. *Warrants.*—Read letter from the Collector of Malabar informing us that an inquiry is being held under the orders of the Inspector-General of Police on the subject of Non-Service of Warrants.

1766. *Destruction of Papers.*—The Honorary Secretary stated that there was an accumulation of papers which he thought should be gone through with the view of destroying any that are unnecessary to keep.

Mr. Powell and Mr. Abbott were appointed a Committee, and authorised to destroy such papers.

A vote of thanks to the Chair terminated the Proceedings.

(Signed) S. H. POWELL,
Chairman.
(„) C. E. ABBOTT,
Hon. Secretary.

Special Meeting.—With reference to paragraph 1744, it was resolved, as Mr. Parker was not present, not to hold this Meeting.

(Signed) S. H. POWELL,
Chairman.
(„) C. E. ABBOTT,
Hon. Secretary.

NEW ARTIFICIAL MANURE.

The British Acting Consul at Christiania (Mr. H. C. Dick) reports, on the authority of the local press, the production of a new artificial manure, "biphosphate," as a result of experiments at the Notodden Nitrate Works. The new fertiliser is a by-product of the nitrate of lime produced at these works and is obtained without affecting the quantity of nitrate produced. Apatite or other raw materials are dissolved in the nitric acid and are then submitted to further treatment. The experiments have been carried out with apatite from the Bamle apatite mines. It is stated that the "biphosphate" should prove very valuable as an artificial manure for replacing both the superphosphate hitherto in use, and Thomas phosphate. It is added that it will probably be possible to place this manure on the market at a low price.

———o———

In July, 1908, a parcel of logwood (*Haematexylon campechianum*) seed was received in Ceylon from Jamaica, having been introduced as a honey plant on the recommendation of the Bee Committee. According to the latest Progress Report of the Ceylon Agricultural Society, the first flowering of the trees in Colombo took place at the Government Stock Garden about the end of January; but Mr. A. P. Goonatilleke, the enthusiastic bee-keeper of Veyangoda, states that the trees on his Kolongasyaye estate (Kurunegala District) flowered as early as April, 1910. As the seeds are winged and the tree grows freely, except at high elevations, it is likely that logwood will become a common plant. Whether it will prove of any value as a source of dye remains to be seen; the imports into England alone are valued at something like a quarter million sterling.

TEA.

The Indian Tea Industry.

THE LABOUR QUESTION.—1.

So far as the tea industry is concerned there would appear to be no signs of relief in the matter of the labour supply. Each year the labour problem becomes more acute, and while the bulk of gardens are still able to cope with the work most essential to their well-being, the whole position is one fraught with anxiety for the future. Famine in the recruiting districts, when it occurs, gives the industry an opportunity of recruiting itself for the annual exodus from the gardens of imported coolies to the waste lands in the vicinity, and short crops also from time to time alleviate the situation. But the constant drain on gardens is greater than the influx, and the position is complicated by high wages, which do away with the necessity on the part of the cooly of working the greater number of days in the month.

This latter phase is responsible in the non-agreement districts for much of the shortage of labour, and it is only a question of time when gardens in Assam and the Surma Valley will find themselves in the same predicament. At present the Act holds in Assam and its *prestige* is felt from end to end of the Valley. Coolies who are not actually under agreement or who are at least only bound by Act 13 are deterred from independence of opinion as to whether they should work each and every day or not. And in any case the discipline on these gardens is so long established that until very late years no cooly attempted to sit in his house at his own sweet will. This desirable state of affairs is rapidly altering, and with the threatened withdrawal of Act 6, it is only a matter of a few years before it is done away altogether and the cooly will say frankly that he will work only when the spirit moves him. The interpretation of a cooly's sweet will in regard to this work has been found to be a period just sufficient to earn the few essentials to support life and indulge occasionally in intoxication. If a cooly can live comfortably on Rs.5 per mensem and fifteen days' work can procure him that amount, it is in the nature of work characteristic to the Orient, highly improbable that he will work an extra day to secure himself an excess wage.

That is the position at the present day in Darjeeling, in the Terai, and in the Dooars, and although coolies in these districts are paid what are very large rates in comparison with Assam and the Surma Valley the history of individual people will show that they work considerably fewer days in the month in the former than in the latter. The constantly-rising rates in the free districts instead of inducing the labour to work more, only enables it to "sit". more, and it is indicative of the hopelessness of the situation that no solution of the difficulty has been found. It is impossible for one garden to hold out against the higher rates, as coolies are naturally attracted to the gardens paying them. The attraction, be it noted, is not that the coolies can earn more, but they can sit more, and this is the crux of the whole position. A garden to get its work done has to support a horde of coolies, the bulk of whom work only when the task is pleasant and the rate high. Combination on the part of employers might help in the circumstances, but it is feared that matters as regards rates have now got beyond control, and since no two gardens are equally affected it is most difficult of accomplishment, especially in view of the general competition for labour which is severe.

In Assam, as already stated, the position is as yet comparatively easy, and by keeping up a large force, gardens are enabled to work their land satisfactorily. In the Surma Valley, however, the effect of the Act has already begun to dwindle, and free labour conditions are rapidly being established. At the inception of these, comparative relief as regards labour difficulties is the first conclusion come to by planters. While the relaxation of discipline which it is found essential to make to retain the labour on the garden is succeeded by a dropping daily *working* muster, the full virtue of *ticca* work as against the old *hazri* system are discovered and *doubles* become the order of the day. It is found that coolies can now be induced to turn out to extra hoeing and extra pruning, and liberal pice to the men bring them to the plucking field in the afternoon when their own work is done.

This is the stage of comparative prosperity through which the free districts have already passed, and it is difficult to believe, on the threshold of what would appear to be a complete solution of the labour difficulty, that a district when reaching this stage enters upon a certain downward course. It is the last move on the board and represents the calling up of the reserves. For a time the cooly from sheer habit turns out to work with fair regularity; and, besides, his cupidity is excited at the prospect of earning money which was unattainable before. Gradually, however, as he finds out that he need not work unless he wishes to and that money is easily come by, he falls back to the Eastern habit of working only sufficient to provide himself with the necessaries of life. These, as has already been pointed out, are unfortunately few, and since what it took 25 days' work to secure heretofore can now be secured in 15 days, the latter represents his maximum month's work.

At this point a garden endeavours to keep up its working capacity increasing the rate offered for piece work or by decreasing the tasks, and as its neighbours are in the same position as regards the labour the enhancement of rates is general. Having once entered upon the downward course it is practically impossible to stay the movement. The coolies clamour for higher and higher rates, and batches move from garden to garden, seeking increased wages, not that they may earn more, but that they may be able to idle more. Each increase in rates eventually brings about a corresponding ability on the part of the cooly to work less and yet live, on the fat of the land. The result is not only higher rates all round but a lower standard of work, until, as may be found in Sylhet already, a cooly expects to earn a full *hazri*, hoeing, for two hours' work.

The above is no exaggerated picture of what is occurring now in Darjeeling, the Terai and parts of the Dooars, and what is history there is surely foreshadowed as regards the Surma Valley and Assam. It will be admitted that rates are rising everywhere, but unfortunately there is no tendency on the other hand for the working capacity of the cooly to rise in sympathy. The case in a nutshell is the difficulty of inducing the cooly set free from discipline to do a full day's work for a full day's wages, or in other words to earn more than is sufficient for his bare wants. We have seen that to increase the rate of wages has sooner or later the opposite effect, and it now remains to search for some means of inducing the coolies to work more in the course of a month or a year.

Any remedy which has for its foundation the attracting of coolies from one garden to another comes, it is submitted, under the category of rate-rising, for two can always play at the game and the result is eventually competition which benefits no one but the cooly. And as to the benefit to the cooly, if we are to be guided either by economic or altruistic principles, no planter who has experience of the Free Labour districts will argue that a cooly is benefitted physically or morally by a system which gives him incomparable facilities for idling and indulging in riotous debauch.—*The Indian Agriculturist.*

COFFEE.

Extracts from Messrs. G. Duuring & Zoon's monthly market-report:—

Rotterdam, February 29th 1912.

Coffee has been firmer inclined but quiet, in anticipation of the Sao-Paulo Government tenders on February 12th, 300,000 bags Santos and Rio, of which 29,866 bags Santos in Rotterdam. Prices paid were above the bid of 83 frs. for good average Havre type. This result was favourably interpreted, dispersing any feeling of uncertainty, which had prevailed previously. A steadier tone has predominated and a renewal of demand soon became apparent, leading to some recovery in values for all descriptions.

On February 6th the first of the two Government sales was held meeting with much competition. 10,051 bags have been sold at the basis of 52 cts. for good ordinary Java, details at foot. Besides, 40,000 bags Santos have been sold in public auction for Trading Company's account.

Importers had very little to offer and values are now ruling ½ to 1 cts. dearer.

The annual figures of production have been out this month. The total production has been 14,666,000 bags, as compared with 19,175,000 bags in 1909/10, being only 39,000 bags or ¼ per cent. less than last year's valuation. Present crops are being estimated as 17,105,000 bags, as against an estimate of 17,933,000 bags last year. The 1912/13 crops are now computed to be 15,480,000 bags but this, of course, may be subject to many modifications between to-day and one year and a half hence, especially so, as an estimate of 8 million for Santos seems to be above the mark by perhaps half a million bags. Anyhow, even making allowance for a small decrease of consumption, a deficiency of some two million bags this year looks within the probabilities.

In Hamburg.

Writing on February 21, 1912, the Hamburg correspondent of the *Economist* reported:—

The course of the market has during the past week shown that another vigorous upward movement in values was being prepared by the same parties who pushed prices across 70 pfennig for futures a few months ago. There has been more energetic missionary work in the shape of cables, claimed to emanate from one of the largest commission houses in Santos, saying that the continuous rains had caused much shedding of unripe berries, and that the next crop would not exceed outside 8½ million bags. Unkind critics here reminded the market that it was not so very long since the same parties propagated the same assertion as regards the current crop, which now, however, shapes for 9½ millions minimum, which, with 2½ millions of Rio, gives 12 million bags. Anybody caring to refer back to reports of last autumn can make comparisons and draw his own inferences as to the value of such information. The point, however, is, as it was then, to attract buyers, and in this the propaganda has been fairly successful. . . . The selling of actual coffee liberated on the 5th instant is said to be going into consumption rapidly, owing to its fine quality. The monthly statistics are expected to be more favourable, and the duty paid on coffee taken out of bond during January is practically the same as a year ago. Cost and freight business has been light and very difficult; the quotation of representative good average Santos has been further advanced to 70*s*. 3*d*., against 69*s*. 6*d*. a week ago. Correspondence received by mail this week speaks in the most flattering terms of the prospects for the crop of 1913-14 where a record yield may reasonably be expected barring bad weather during development.

RUBBER.

Rubber Estates in British East Africa.

The latest reports on various rubber estates, according to the *Leader* of Nairobi, suggest a promising future for the rubber industry in East Africa. One of the most speedily developed estates in the whole country is in Kibos-the Kisumu Rubber Estates. No fewer than a thousand acres of Ceará Rubber have been worked at since October of last year. Rubber area on this particular estate comprises six thousand acres, including two miles of railway. An expanse of nine hundred acres will be planted during the rainy season. Another 470 acres at Mumias Road is mostly given up to rubber. A Rubber estate at Muhoroni may be noted as another specimen of the general progress of the rubber industry in the country. One hundred acres have been broken up since April last from an estate of one thousand acres, showing and proving itself prosperous in every way. It has been found advisable to plant seedlings in nurseries, as planting at stake often leads to disaster.

Monthly Crops From Young Estates,

It will be remembered that last year most plantations in Malaya and Ceylon suffered considerably from drought. In Ceylon the dry weather should now have set in; it usually extends from January to April. We, therefore, think that all investors should anticipate large monthly increases of crop for the first quarter of the year from most Ceylon properties which have entered the producing stage; in fact it is quite likely that February aud March crops will be below those for December and January on several estates. This periodicity, especially in Ceylon, must not be lost sight of by those responsible for delivering specified quantities each month to meet forward contracts.

In Malaya we do not expect the same pronounced periodicity in estate crop returns unless the dry period of last year is, in intensity, repeated. It will be re-called that the combined effect of drought and foliar change—the trees changing their leaves every year during January to March,—was so great in 1911 that many managers raised the question of stopping tapping altogether during this period. This view was publicly ventilated by Mr. Malcolm Cumming at the annual meeting of the Linggi Rubber Company, but whether any decision was arrived at is not known. In the dry season latex does not flow freely, and a large area of bark is apt to be used up if the usual coolie tasks are insisted upon during this period. Personally we are inclined to the view that cessation of tapping on any estate is not practicable except on properties where the labour can be used in arrears of weeding, or on inter and catchcrops of coffee, sugar, etc. That the dry period should be regarded as one when arrears of other estate work can be overtaken and tapping be allowed to slacken for a time strikes us as being more feasible; even then serious disorganisation of the labour force and factory operations may result.

Apart from the temporary dry-season reduction on many estates, we imagine that shareholders in other companies will feel satisfied at the results now being recorded from comparatively young trees. In one or two years many properties which only recently entered the producing stage will have their total planted acreages in bearing. They will then compare very favourably with older companies whose shares have been maintained, on their merits, at prices showing large capital appreciation. The older companies certainly benefited in so far that their early clearings were brought to the productive stage at a lower cost, per acre, than others commenced since, say, 1908. But whatever that reduction was no one can deny that the capital appreciation which followed and in some cases, still exists, brought the capital cost, based on the price of the share, to form £200 to £300 per acre. When the old and young companies have each their total planted acreages in bearing, a movement, possibly, a double one, in shares values seems inevitable. The profits will then be in direct relationship to the capital costs per acre and under these circumstances it seems quite probable that the prices of the respective shares will so move that they will become more nearly equal. In most cases this means a rise in capital value of the young producers.

In order to make the increase in yielding capacity clear, the crops, in lb., from young estates for the month of January, in the years 1912, 1911 and 1910 are given:—

Estate.	1912.	1911.	1910.
Jeram	6,219	2,140	—
Ulu Rantau	17.914	12,170	1,286
Langkat Sumatra ...	16,090	6,330	1,875
Sumatra Pará	33,000	20,384	6,720
Bandar Sumatra	4,375	2,231	290
Lavant	6,750	3,372	500
Grand Central	44,633	23,946	—

These increases from estates in Malaya, Sumatra and Ceylon unmistakably point to very rapid progress during the next few years; an increase which should serve to recompense those who have held on to their stocks throughout a period of considerable anxiety. When to this is added the fact that plantation rubber can be sold for 1913 at over 4s. per lb., there is some reason apparent for the revival in plantation shares which has recently been witnessed.—*India-Rubber Journal.*

Vitality of Rubber Seeds.

Mr. F. G. Spring, Superintendent, Government Plantations, F. M. S., writes in the *Agricultural Bulletin of the Straits and F. M. S. States*:—

Seeds of *Hevea brasiliensis* do not retain their vitality for a long period and the consequent difficulty of forwarding them successfully to distant countries is well known. This year several hundred thousand Pará seeds from tapped trees were packed in Venesta chests with charcoal and forwarded to Trinidad. The results obtained were far from satisfactory although the seeds were most carefully selected and packed.

There is no doubt that seeds picked immediately on falling, and carefully packed, give the best results. If they are allowed to be on the ground, or if badly packed, a smaller percentage of germination will be obtained. It must be borne in mind however, that no matter how the packing has been done, the vitality of Pará seeds cannot be retained for any length of time if they are not gathered immediately. The seeds must not be packed too many in a box, otherwise fermentation starts and the whole mass heats and loses its vitality; the packing material must be just sufficiently moist to prevent the seeds from drying out and not moist enough to encourage the growth of moulds and bacteria. For the same reason the packing must be fairly tight and yet not quite air-tight. Small boxes seem better than larger cases.

Experiments have been carried out as mentioned in a previous article at the suggestion of the Director of Agriculture to compare the germinating power of seeds from tapped and untapped trees (Experiment I) and to see if by coating the surfaces of the seeds with various substances (Experiment II) the germinating power could be retained for a longer period.

The tapped and untapped trees selected for the experiment are 12 years old; the first mentioned have been tapped for the last 2 years, the seeds were collected fresh each morning and treated as mentioned in the following list:—

EXPERIMENT I.

The Vitality of Seeds from Tapped and Untapped Trees.

All seeds were packed with burnt paddy husk in biscuit tins, each containing 200 seeds. The tins were wrapped in brown paper and sealed.

Boxes Nos. 1, 2, 3, 4, 5 and 6 were kept 3, 5, 7, 8, 9, and 10 weeks respectively then opened, and the seeds planted in well prepared nursery beds. It will be seen from the tables that seeds from untapped trees gave on an average 50 per cent. higher germination than those from tapped trees reckoned on the absolute percentage. In each test the former showed from two to three times as many germinations as the latter.

A record of similar experiments is published in the Circulars and Agricultural Journal of the Royal Botanic Gardens, Ceylon, Volume IV, No. II, May 1908. This circular states that " seeds from tapped trees kept for five weeks did not germinate but those kept for four weeks showed 28 per cent. germination, while seeds from untapped trees kept for four weeks did not germinate and those kept for three weeks showed only 3 per cent. germination. Both in percentage, germination, and time of germination the seeds from tapped trees are better throughout." No information is given regarding the manner in which the seeds were kept previous to planting.

It will be seen that the Ceylon figures are at variance with those obtained here, but it is difficult to say why this should be.

The Ceylon Circular also states that seeds from tapped trees are smaller, weigh less per 1,000 seeds than those from untapped trees. This agrees with the figures obtained here, namely, seeds from untapped trees were found to be on an average of 10·7 per cent. heavier than those from tapped trees of similar ages. The figures in Experiment I are of interest not only as regards the suitability of exporting seeds from untapped trees but they also tend to show the effect tapping has on the vitality of the seed. Tapping lessens the weight and size of the seeds, and according to the present experiments reduces the germinating power.

It is evident that seeds which are to be exported are best selected from untapped trees.

Experiments are to be conducted to compare the growth of plants resulting from seeds of tapped and untapped trees.

TABLE I.

Percentage of Seed Germination obtained from Tapped and Untapped Trees.

No. of box.	No. of seeds in box.	Length of time the seed were in boxes.	No. of plants obtained. Tapped.	No. of plants obtained. Untapped.	Percentage of seed Germination. Tapped.	Percentage of seed Germination. Untapped.
1	200	3 weeks	67	156	33	78
2	200	5 ,,	46	133	23	66
3	200	7 ,,	48	100	24	50
4	200	8 ,,	40	167	20	83
5	200	9 ,,	40	164	20	82
6	200	10 ,,	49	165	24	82

EXPERIMENT II.

The Preserving of Rubber Seeds from Tapped Trees.

The seeds in these experiments were collected and packed in a similar way to those in the first experiment but they were coated respectively with bees wax, hard paraffin, and vaseline. The bees wax and hard paraffin were melted and the seeds dipped into their respective liquids, allowed to solidify and then packed. Previous to planting the seeds, the hard paraffin, bees wax, and vaseline were removed.

The percentage of germination of untreated seeds from tapped trees can be seen by referring to experiment I. On compàring this with the seeds coated with bees wax it will be seen that the latter showed an increased germination to the extent of approximately 30 per cent. The seeds coated with hard paraffin gave better results than untreated seeds from tapped trees but not as good as those coated with bees wax.

The seeds treated with vaseline did not germinate The coating of rubber seeds with any substance is undoubtedly an expensive treatment but if seeds have to be sent to countries which take from 1½ to 2½ months to reach and seeds from untapped trees cannot be obtained, then, I think that the extra percentage of germination resulting from seeds being coated with bees wax would more than repay the extra expense entailed by this system of treatment.

TABLE II.
Percentage of Germination of Seeds from Tapped Trees coated with Bees Wax and Paraffin.

No. of box.	No. of seeds in box.	Length of time the seeds were in boxes.	No. of Plants obtained.		Percentage of seed Germination.		
			Bees Wax.	Paraffin.	Bees Wax.	Paraffin.	Un-treated.
1	180	3 weeks.	107	62	59	34	33
2	180	5 „	108	71	60	40	23
3	180	7 „	94	74	52	41	24
4	180	8 „	82	66	45	37	20
5	180	9 „	100	61	55	34	20
6	180	10 „	86	58	47	32	24

* Untreated seeds from tapped trees (see Experiment I.)

In no case was there apparent a large falling off in germinating power from the third to the tenth week.

It is hoped to repeat both experiments in 1912.

Experientia Docet.

A thoroughly "experienced" young rubber planter arrives on an estate to interview an old Pará rubber estate manager before proceeding to his own.

"Have a walk round the estate," says the old manager.

"Only too anxious," says the young experienced man.

Manager takes youngster through the Pará Rubber Nurseries.

"What are these growing here?" asked the experienced youngster.

"Oh!" says the manager, "castor-oil plants!"

"By Jove," the youngster replies, "I have never seen such fine castor-oil plants in all my life—really magnificent!"—J. M. H. in the *Rubber World*.

SELECTED CUTTINGS.

A Simple Method for the Desiccation of Tropical Produce on a large scale by means of Fans and Hot Air.

Tropical Life writes:—

Although, when of sufficient capacity and not too costly, some of the vacuum and other dryers on the market give every satisfaction, "a day will come," in fact, is already here, when entire buildings of ample dimensions will alone suffice to dry the large and rapidly increasing crops that modern companies and centralized organizations are putting forth on all sides. Tea-withering and drying factories and tobacco withering and curing barns are, of course, old-established conveniences on these lines, whilst the rubber-smoking shed has lately been added to keep them company. It only remains to extend the same principle to copra, cacao, maize, coffee, spices, &c., only in their case the interior of the buildings will require to be modified. This being so, we throw out the following suggestions, which when followed up and amended to suit local requirements, will, we believe, help to solve the difficulty of large areas being able to dry their crops of all kinds at a comparatively low cost. We had intended to include a drawing showing the elevation of the building, together with a rough estimate of its cost, in addition to the plan shown here, but want of space forces us to hold it over for our March issue.

First, think well of what is required, *viz.*, a chamber, heated above the temperature of the air outside, with a floor area extending almost into acres, over which the produce can be laid out and dried quickly and cheaply, shut off from the dirt and wet outside "patios" or "boucans." Let us imagine that the produce to be treated is either cacao on one of the large estates, as "Boa Entrada," in San Thome, or an equally extensive one in Bahia, supplying the well-known superior K. P. Mark; or else copra in the Philippines, Ceylon, or the South Seas. Now an acre is roughly 70 by 70 yds. sq., or 44,000 sq., ft.; therefore a building with four floors, each 92 by 30 ft., would give an area, not including the ground floor, of 11,000 sq. ft.. or about a quarter acre when you allow for the edgings that we cut off, odd corners, the boarding, &c. The attached diagram shows such a building, about 100 by 30 ft., with an eight-foot air shaft cut off each end. These are skeleton floors with strong woven wire stretched tightly across, and securely fastened on all sides to the joists placed two or three feet apart underneath. Over the wirework, which must be of a small mesh, both for strength and to keep the produce as much as possible from falling through, it would probably be found best to lay loosely woven sacking or native-made matting, to prevent rust from affecting the produce, the small beans from falling through, and also, when dry, to facilitate and hasten the collection and removal of the dried article which can be taken to the side and lowered down the canvas or boarded shoots, whilst fresh supplies come up by the lifts on the other sides of the building as shown. Loose planks, at least an inch in thickness, will be laid about as desired to enable the men to move about among the produce as they wish, and require to do, to attend to it whilst being dried. By having the boards loose they can be placed as is most convenient. Based on actual results obtained, such a building is estimated to dry 48,000 lb. of copra per day of ten hours.

Having thus described the flooring, we will explain the working of the building as a drying machine on a large scale. The heaters, which will burn husks or other refuse as fuel, heat part or all of the air blown through their air-ways by the four propeller fans, two to each heater. A by-pass duct and a swing valve enable any desired proportion of normal air to be forced direct into the building without going through the heater. This provision enables the temperature in the building to be kept under control. The air from the heaters and by-passes is forced up through the four floors to the roof space. The four large circulating fans draw most of the air from the roof space down again into the ground floor, whilst the rest passes out through the two louvred turrets in the roof.

By means of the circulating fans all the air is made to pass three or four times through the four drying floors, thus ensuring it picking up all the moisture it will hold before leaving the building. All the fans are driven from shafts in an underground channel, as shown on the diagram, and these shafts are driven in turn from two oil-engines, which can also be used to drive the lifts.

It will be noticed that the machinery is in two sets, one at each end of the building, which is divided into two, each half being supplied with its own stoves, fans, &c. The advantages of this are apparent: (1) In case of a breakdown, or to repair the floor, &c., work is not altogether stopped; (2) filling and emptying is carried on more quickly and with less waste of drying time than if the whole building had to be emptied or filled at once; (3) when full, the warm air gets up to the required temperature more quickly; (4) when crops are short the half building can do better work than the whole, and cost less to run; (5) when the house wants aerating or sweetening, which is done by the fans without any heated air, the half building can be affected much more quickly than can the whole one.

The perforated floors, even when covered with the sacking or matting, make the most of these continuous currents of air, which can be increased or reduced to any speed, by simply adjusting the speeds of the fans. This should enable the produce to be evenly and thoroughly dried in the quickest manner possible without any fear whatever of scorching or discoloration. The scheme as here roughly outlined and modified to meet local requirements, will, we should imagine, also enable the produce to be treated with the least amount of hand labour, cost of fuel, &c. The buildings themselves need not be costly. Stairs or ladder ways can go up from floor to floor through openings at either side, or outside the building if preferred; whilst the exteriors being of corrugated iron, or other practically fire proof material, must be also dust-proof, because almost airtight, and can be used for any produce and, with some interior adjustments, for hides and timber. When cacao is to be dried after rubber or other produce has been previously treated, the windows and doors should be opened and the fans allowed to run for a short period to thoroughly sweeten and ventilate the building.

The Klanang Produce Company, Ltd., lately gave the *India-Rubber Journal* the following account of the methods employed in the preparation of their Rubber smoked sheet. The trees are tapped in the usual way, and only the cleanest water possible is used. The latex is taken to the factory and passed three times through fine wire gauze strainers. It is then mixed with the smallest quantity of acetic acid that will cause it to coagulate, and poured into enamelled iron coagulating dishes and left to stand overnight. In the morning it is hand rolled with a wooden rolling-pin, in order to take as much of the water out of it as possible; it is then passed twice through a smooth roller, and once through a roller which puts a pattern in it. After this it is hung up to drain, weighed, and taken to the smoke house, where it remains until dry and ready for packing.

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The Scientific Officer.

In response to an urgent call for his services, Mr. R. D. Anstead, B. A., left headquarters on Tuesday, the 2nd instant. and proceeded to Mercara. The date of his return is uncertain, but is not likely to be before the 12th instant.

The First Assistant Scientific Officer.

Mr. G. N. Frattini is to come out to Ceylon by the P. & O. S. N. Co's ss. *Nore*, and is expected to arrive in Madras very early in May. After a short stay here, he will proceed to the Mysore planting districts, to take up his work there.

The British Tea Duty.

By a resolution of the House of Commons the British Import Duty on Tea has again been fixed at 5*d*. per pound. The Budget for 1911-12 shows what is described as "a record surplus," but no reduction in the above duty appears to be contemplated.

Non-Execution of Warrants.

In a letter dated March 28, 1912, Mr. C. E. Abbott. Honorary Secretary, Wynaad Planters' Association, writes:—

The following letter from the Collector of Malabar which was mentioned in the last proceedings of the Wynaad Planters' Association will be of interest to those of your readers who took part in the discussion about the non-execution of warrants last year.

(*Letter referred to above.*)

"In reply to your letter of the 5th July 1911 enquiring whether any steps are being taken to improve the execution of warrants under the Planters' Labour Act I of 1903, I have the honour to inform you that under the orders of the Inspector-General the Deputy Inspector-General of Police is making a thorough enquiry into the causes of failure to execute these warrants in the Districts of Coimbatore and Malabar. The result will be reported in due course to the Inspector-General and I have no doubt that your Association will be put in possession of the Inspector-General's conclusions.

"As you are aware, I too have been making enquiries into the matter on my own account. I have embodied my views in a note of which I have furnished a copy to the Deputy Inspector-General of Police. In view of the Deputy Inspector-General's enquiry, however, I do not propose to take any further action at present."

Scientific Officer's Papers.

XCVI.—The Structure of Roots.

In my Paper No. 70 (*P. C.*, Vol. VI, p. 409) I described the outward appearance of roots and touched on their functions. In this Paper I propose to try and describe in simple language the internal structure of roots and how their functions as absorbers and carriers of water and plant food are performed.

When a section of a young root is examined under the microscope the centre of it is seen to be traversed by a cylindrical strand of vascular, or conducting tissue, which runs straight from base to apex. This is in direct continuation with a similar conducting tissue in the stem which ends in the veins in the leaves as described in my Paper on Leaves a couple of weeks ago.

This central cylinder of tissue is surrounded by a layer of thin walled cells, called the *pericycle*, which is important, for from it all the branches of the root arise. This is surrounded again by another layer of cells, called the *endodermis*, which have thickened walls where they touch one another, to prevent water passing from one to the other. Outside this is a third layer of tissue with thin walled cells which is known as the *cortex*. The cortex is bounded on the outside of the root by the *epidermis* consisting of thin walled cells many of which on a young root grow out into *root hairs*, about which I shall have something to say presently.

Let us now return to the central cylinder of conducting tissue. This consists of two distinctive kinds of tissue. On the inside is what is known as the *Xylem* consisting of long continuous tubes which extend for some distance without any interruption and they contain when mature only water and air. These cells are known as *vessels* and their walls are thickened by spiral threads of cellulose and their structure is indeed exactly like that of an Indiarubber hose with a stiff spiral wire coiled inside it to prevent it collapsing. The Xylem in addition contains vessels which are strengthened with a net work of cellulose, and with rings of it, and also vessels with small openings in their walls to allow of the sideways passage of liquids. These vessels are open channels and pipes through which the water passes upwards to the stem and so eventually to the leaves.

The outer part of the central cylinder is known as the *Phloem*, and this consists chiefly of long cells placed end to end, the end walls in contact with one another being perforated as though they were divided by a number of sieves, indeed they are often called sieve tubes. Here again the cells form an open channel, or pipe, except for these sieves, and along these vessels the sap containing the foods manufactured by the leaves passes downwards to growing tissues where it is needed. This central cylinder is in fact the water and sap conducting tissue.

Between the *Xylem* or *Wood* and the *Phloem* is a layer of special very regular cells, which can divide and grow very rapidly. This is the *Cambium* and by its means the root increases in thickness. The cambium forms cells on the inner side which ultimately become *Xylem vessels* and cells on the outer side which ultimately become *Phloem vessels.*

It has been already mentioned that some of the cells of the outer-most layer of the root grow out into *Root hairs.* These root hairs are very important organs; they take up all the food which the plant obtains from the soil. Each root hair is a single cell with a very delicate outer wall, and its function is an absorbtive one. The root hairs grow between the small particles of soil and attach themselves to them and absorb water and the mineral substances contained in it in solution. They also excrete an acid by which minute quantities of salts like Calcium phosphate are brought into solution and then these are absorbed. The water and mineral food thus taken in is forced up the conducting tissue of the root to the stem and through the stem to the leaves.

Now these root hairs are only formed near the tips of young roots, the feeding roots in fact, and since it is only by their means that the plant can obtain water and mineral food from the soil it is of the utmost importance that they should not be cut or damaged in any way while the plant is growing rapidly and requiring large supplies of food, and this fact has an important relation to digging and methods of cultivation of permanent crops.

RUDOLPH D. ANSTEAD,

Planting Expert.

CHINA TEA.

There has been an utter cessation of business, and the demand this week, owing no doubt to the coal strike and the few sales that have been made, were of the most retail order. Importers, however, are not pressing for sales, partly for the reason that it would be no use and also on account of the good statistical position. At the rate we have been delivering of late, stocks will be very small by July, while the very unsettled state in China will probably delay the first arrivals some weeks later than usual. Latest information from most reliable sources in China say that the first crop from the North will be at least 30 per cent. less under the most favourable circumstances, as the ports of Ichang and Kiukiang, the two principal centres for the first crop Monings, have been subject to much looting and devastation, so much so that both the Chinese and European merchants will not care to trust their money and merchandise to the possibility of its being taken by rebel soldiers and robbers. This market is not taking any notice of the uncertainty of future supplies, as it forms such an infinitesimal part of our home consumption, but to Russia it is very important, and if they take fright they might soon clear off our stock here. At the moment, however, Russia is well supplied, as they were larger buyers this season than usual in China, owing to the high prices ruling for Indian and Ceylon teas. Small lots of medium to fine Keemuns were taken this week at 9*d*, to 1s. 3*d*., with good grades of Ningchows at 6¾*d*. to 8*d*., while business was also done in sweet and good common at 5¾*d*., to 6¼*d*., prices showing little change. The cheap rates that have been recently accepted for good medium Panyongs and Ching Wos from 7½*d*. to 9*d*. has attracted Continental buyers, and several orders have been put through of late. Inquiry also continues good for Panyong kinds round 6*d*. per lb. Blenders have taken siftings between 4*d*. and 5*d*., but supplies are in small compass. Common to fair grades of Oolong realised 5¾*d*. to 8½*d*. in some quantity for blending purposes. Souchongs under 1s. are in continued request, and scented teas are most difficult to move.—*Grocer*, March 9, 1912.

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MORE ATTENTION TO COFFEE CULTIVATION IN JAMAICA.

The rise in the price of coffee has increased the attention paid to the cultivation of that plant in Jamaica. The yield of cocoa (cacao) is also increasing. It ranks next to coffee among the cultivated crops of Jamaica. Besides the establishment in St. Mary that purchases and dries annually about 2,000,000 pounds of the beans for shipment to England there is in Portland a large planter of cocoa who also sends his crop to the mother country to be manufactured into chocolate and other preparations.

DISTRICT PLANTERS' ASSOCIATIONS.

Coorg Planters' Association.

Minutes of a General Meeting held in the Bamboo Club, Pollibetta, on Thursday, March 21st, 1912.

PRESENT.—Messrs. Macrae, Grant, Mahon, Maclean, Gerrard, Jackson. Newbery, Bracken, Shaw, and W. M. Ball, Honorary Secretary,

The Honorary Secretary in the Chair.

U. P. A. S. I. Conference.—Messrs. J. A. Graham and E. L. Mahon were elected as delegates. Mr. Jackson proposed and Mr. Bracken seconded: "that the Honorary Secretary be also a delegate on the usual terms." —Carried.

Mr. Mahon thanked the members for having elected him and promised to do all in his power. The Honorary Secretary also thanked the members, and expressed his willingness to attend if required.

Scientific Officer's Assistant Fund.—The Honorary Secretary made a statement reporting the progress made for the benefit of those who do not belong to the fund and in doing so reminded managers and owners who had not already joined that as the fund had agreed to pay 2 annas an acre to the U. P. A. S. I. other members were relieved of this subscription. Mr. Jackson pointed out that this would work unfairly, as those who did not join paid a very small subscription in comparison. A lengthy discussion followed, from which it appeared that the feeling of the meeting was that the annual subscription to the U. P. A. S. I. should if possible be paid from the general funds of the Association without however driving out non-landholders, etc., by a too enhanced subscription. Finally Mr. Jackson said he had brought the matter up merely for discussion and that he was content to allow things to remain as they were for the present. The subject therefore was dropped. The Honorary Secretary also informed the meeting that a small deputation, consisting of Messrs. Graham, Mahon and himself, and kindly accompanied by Mr. L. T. Harris, I.C.S., Commissioner of Coorg, had waited on the Chief Commissioner during his recent stay in Mercara to ask for a grant from the Local Government in aid of the fund. They had a very sympathetic hearing from Sir Hugh Daly, who, however, asked for more details as to what would be the advantages to the Province and what would be a fair contribution, and these will be sent in at an early date.

Police Escorts.—Read letter from the Assistant Superintendent of Police asking members requiring a Police Escort to give at least 3 days' notice to the Sub-Inspector concerned.

Cattle Trespass.—Read letter from the District Magistrate pointing out that under the Act Magistrates could only give compensation on damage being proved.

Labour Circulars.—Mr. Mahon asked about these and expressed his disappointment that they had not as yet been issued, this being the time when the year's labour supply is being arranged for. The Honorary Secretary explained the position so far as he knew. Resolved: "that Mr. A. H. Jackson, C. G. Maclean and the Honorary Secretary be a sub-committee to draw up a Labour Circular to be issued as soon as possible."

Roads, etc.—Mr. Jackson informed the meeting of what had been done about the Pollibetta-Sidapur Road and said there was every prospect of the work being carried out. Mr. Mahon proposed and Mr. Bracken seconded a vote of thanks to Mr. Jackson for the trouble he had taken in the matter. —(Carried).

Mr. Maclean proposed "that the Local authorities be asked to take steps to a stricter enforcement on cart traffic of the Road."—(Carried).

A vote of thanks to the Chair closed the meeting.

(Signed) W. M. BALL, *Honorary Secretary.*

Hamburg Coffee Market.

The Hamburg Correspondent of the *Economist* reported on February 28th:—

The coffee market has continued in a dull state throughout the week. It is not allowed to decline; support from the usual sources is always at hand when anything like selling pressure appears. It does not advance, because prices are already high, the majority of the trade seem to think unreasonably high. Business therefore continues desultory, mostly made up of scalping deals opened one day and closed the next, or as soon as the smallest fraction of profit is in sight. There are factors in favour of the international group of manipulators; consumption is going on, and country stocks are probably small; there is more insistent and more general talk of a very small Santos crop next season; so, for instance, an estimate from a good source that the 1912-13 yield would not exceed 7½ million bags outside. It was said that the constant rains had caused very heavy shedding of young fruit. On the other hand, the spot demand of the hand-to-mouth order is likely to continue, especially as the quality of the current crop is not particularly good; the receipts at the two ports continue liberal for the period of the season, and there is a growing inclination to look for a final crop of 10½ million bags in Sao Paulo. The bears attach little importance to low estimates of the next crop, and point to several seasons which began with similar low figures and ended with a yield of from 50 to 80 per cent. over first estimates. European deliveries to consumers during February are expected to be about 150,000 bags larger than a year ago, and the world's visible supply is expected to decrease about 500,000 bags against a reduction last year of 325,000 bags. The bulls claim that statistics for the rest of this crop year will be all in their favour, because last year deliveries were exceptionally small during the months of March-June. Perhaps they forget, however, that the larger deliveries—if they actually occur—will be offset by considerably larger fresh supplies coming into sight. Closing values to-day are on a balance unchanged to ¼ pfg. higher, as follows:—March, 66 (66); May, 66¾ (66¾); September, 67¼ (67); December, 67 (66¾). Yesterday 40,000 bags of March tenders were issued, but had no effect on the market as the big clique houses took care of them.

Coffee in British East Africa.

The cultivation of coffee is now said to be the most lucrative and promising of the farming operations carried on in British East Africa. It flourishes in all seasons, and gives certain returns after two or three years, provided the soil is favourable. The market shows no signs of weakening. Disease has wrought no havoc so far, but, of course, the risk of its doing so must be reckoned ere calculating the value of a plantation. The future of coffee is promising, and will remain so, provided the entomological and bacteriological departments are efficient and watchful. They should be able to correct any disease that may threaten the plants.

SELECTED CUTTINGS.

Glycine Soja. SOY BEAN—BHATMAS.

In the Annual Report of the Kalimpong Demonstration Farm, 1910-1911, issued by the Department of Agriculture, Biogel, it is stated:—

This crop which has recently aroused a great deal of interest is represented in these hills by six varieties as follows:—

A. *Plants of trailing habit, growing 3 to 6 feet in length.*

1. GRAIN, LIGHT GREEN.—This is the most popular variety as a food being considered to have the finest flavour, but it is not grown except in small quantities.

2. Grain, chocolate coloured.

3. Grain, black.

Neither of these two (2) and (3) is cultivated separately except on very small plots, but the seeds are usually found mixed in ordinary samples of Bhatmas.

B. *Erect growing varieties $1\frac{1}{2}$ to $2\frac{1}{2}$ feet in height.*

4. GRAIN, YELLOWISH BROWN.—This is the most common variety and can generally be obtained in the bazaar. It is known as Barmeli Bhatmas.

The grains of these four varieties are fairly similar in size.

5. GRAIN, WHITE AND RATHER BIGGER.—This is not so much grown as No. 4.

6. GRAIN, CHOCOLATE COLOURED.—This variety known as Nepali Bhatmas is not much grown. I have never seen it in the bazaar and have found difficulty in getting a few seers for seed. The grain is much larger than any of the preceding kinds, is round in shape and rather bigger than the ordinary garden pea.

This kind also differs from the others in the method of cultivation, it requires to be planted considerably earlier, *i.e.*, from April to the beginning of June, and will not grow successfully when sown among maize, as the either kinds usually are. It would not appear to stand shading and requires to be cultivated as a separate crop on open ground. This is a great disadvantage and probably accounts for the fact that it is not commonly grown.

This year a quarter of an acre was cultivated at the Demonstration Farm among maize, and gave very poor results, the yield being only at the rate of about $2\frac{1}{2}$ maunds per acre. Next year it will be grown separately, and better results may be expected.

The usual method of cultivation of the first five varieties is as follows:—After the maize crop has received the second hoeing and the weeds have been carefully buried the seed is sown among it at the rate of half a maund per acre in June or the beginning of July. After the maize has been harvested the top parts of the stalks are cut off and carried away, and the Bhatmas is then hand weeded. The weeds may be pulled up and laid on the ground if the crop is not very thick, but they are often tied on the maize stalks which have been left standing. After weeding the crop soon covers the ground with a mass of luxuriant vegetation, the appearance of which is very fine. Soy bean ripens in November. The leaves usually fall off before the crop is harvested and add to the manurial residue left by the roots, the nodules of which are very conspicuous.

There is not much local sale for Soy beans. The price is from Rs.2-8 to over Rs.3 according to the season. The straw of this crop is very coarse, and not much liked by stock when dry. It is useful for bedding and adds to the value of the manure.

Bhatmas will be employed in the manurial experiment for rice, as it is much more suitable here than Dhaincha.

For green manuring purposes for tea or other crops the erect growing varieties will be found the most satisfactory as they do not climb on the tea bushes and are also much more easily dug or ploughed in. No. 4, Barmeli Bhatmas, is probably the best variety, and as this is the one usually grown by the native cultivators seed could easily be obtained. No. 6 is said to grow at higher altitudes than the other varieties.

I have had a number of enquiries about Soy bean and have supplied 10 maunds for green manuring purposes to a tea garden in Darjeeling as well as small amounts elsewhere. In addition two consignments were sent to Assam gardens through Dr. Hope, the Scientific Officer of the Tea Association. Samples of four other leguminous crops from this farm were also sent to Dr. Hope for experimental purposes.

The Soy bean is cultivated on the higher elevations up to 6,000 feet where *dâl* will not thrive.

In 1909-10 a small area was sown at the farm, but the crop was rather thin and the yield only at the rate of 5 maunds 13 seers per acre.

During the year under report, in addition to ¼ acre of Nepali Bhatmas and a small patch of the black variety which was sown to provide seed for another year, Barmeli Bhatmas was cultinvated on 1·5 acres and gave the following result:—

YIELD PER ACRE. Grain.		YIELD PER ACRE. Straw.		Value of Yield.			Cost of cultivation per acre.			Profit.		
Mds.	s.	Mds.	s.	Rs.	a.	p.	Rs.	a.	p.	Rs.	a.	p.
14	35	17	24	47	9	3	21	4	0	26	5	3

The grain is reckoned at Rs.3-2 and the straw at 1 anna per maund.

The above figures show this crop to be a very profitable one apart from its manurial value. The best half acre, which gave an outturn of 8 maunds 23 seers, shows a profit at the rate of Rs.33-1-0 per acre, which is much the same as the average for the maize crop itself. As a crop to follow maize it is excellent, and its cultivation and use seem to be worthy of extension.

Five varieties of Soy bean will be grown in 1911-12.

Samples of the Kalimpong varieties of Soy bean were sent to the Indian Museum.

The following table shows the percentage of oil contained:—

Number as above.	Museum number.	Variety.	Oil.
3	31,565	Black	16·50
5	31,566	White	16·51
2	31,567	Brown	17·25
1	31,568	Green	19·52
4	31,569	Yellowish	16·62

Average percentage of oil 17·28.

Two general analyses of Soy beans are given:—

1. From a paper on the Soy Bean by Mr. Hooper (Agricultural Ledger, 1911, No. 3, reproduced from Church's Food-grains of India).

2. From the Standard Cyclopedia of Modern Agriculture:—

Water	11'0	10'41
Albuminoids	35'3	40'50
Oil	18'9	17'47
Carbohydrates	26'0	22'38
Fibre	4'2	4'21
Ash	4'6	5'03
	100'00	100'00

Although varying considerably, both these analyses show the Soy bean to be extremely rich both in oil and albuminoids.

Clean Cultural Practice Method for Fighting Insect Pests.

Mr. Edw. M. Ehrhorn writes in the *Hawaiian Forester and Agriculturist*:—

In the course of the ages through which our world has existed, there has been gradually established, by the influence of surroundings, a certain ratio between animals and plants. There is a continuous struggle going on among the plants themselves as well as a struggle between the plants and insects. This has been more generally observed where nature's influence has been upset, making surroundings as it were unnatural. Extensive planting of one plant or other has created abundance of food which very soon is eagerly sought by various enemies, either fungi or insects, and nature is unable under such conditions to hold her balance.

From the time that man began to cultivate, his crops have been attacked by some pests, be it vegetable (fungi) or animal (insect pest) and we find in some of the oldest books on gardening and entomology how the early farmer and horticulturist had certain remedies to combat the enemies of his crops with. Many of these were rather queer in their composition. I remember reading of a remedy which was used in the Southern States consisting of lime, soap and whisky.

Within the last decade great strides have been made in fighting pests but it is not my intention to-day to dwell on insecticides and their uses, nor on parasites and predaceous enemies of our pests, nor on the great benefits which have been derived from such methods. I am going to draw attention to a method which I am sorry to say is but little known in these Islands, and which, if taken up by the various growers, will do much to check the ravages now caused by various pests. I draw your attention to the practice of clean culture. Cleanliness on a farm, in a field or in a garden means much to the crops or to plants and much toward the reduction of pests. Why? Clean culture means cleanliness; the destruction of weeds, the removal of crop remnants as soon as the crop is done; picking up and destroying dropped fruit, removing, burning up, or otherwise destroying all rubbish that cumbers the ground. Experience has shown that many of our pests are protected by these very materials which we should get rid of.

Take our melon fly as an example. This pest has been in the Islands over twenty years and it is to-day one of the worst pests we have. It is next to impossible to raise cucumbers, melons or squash and only by covering over these is the grower rewarded by being able to raise a few inferior melons. Why is this so? Anybody can go into the outskirts of Honolulu and he will sometimes see fields of cucumbers, melons and the like lying about the ground and if he should take the time and examine a few he would find them decayed and alive with maggots, a large per cent. being those of the melon fly. What if clean cultural practice were employed, the gathering up and destroying of all such rotten, infested produce? Some time ago I cut a small piece of a water melon from one found in a field and placed it in one of my breeding jars. From that piece, about 3 inches square, I bred 109 melon flies, not counting a large number of decay flies which also issued from it. I have often wondered how many flies could have been bred from the melon and how many flies would have bred from the field on which were many hundreds of melons. Would clean cultural practice pay in a case like this one? It surely would, and on account of the habits of the insect, clean cultural practice would be the only profitable way of coping with the pest. I mentioned the destruction of weeds as pertaining to clean cultural methods. Many fields after being planted to various vegetables are allowed to grow up in weeds and the crops usually are of inferior quality. Not only that but certain pests are attracted to the weeds and also find good food on the growing crop. After the crop is harvested the rubbish and weeds are usually allowed to remain for some time and many insects collect and hibernate in the tangled mass, patiently waiting for the next planting to be made. Now that the Mediterranean fruit fly is with us we can readily see that the practice of clean culture, the collecting and destroying of all infested fruit will do much toward checking this pest. In fact I have already met several who have started this method and they have reported improvement in their crop conditions.

In a vegetable garden not long ago I saw a lot of old cabbage plants, the remnants of the crop. The heads had been cut out and the stump left and new growth had started and these plants were completely covered with the cabbage aphis and nearby the ground had been prepared for another cabbage crop. Now if the plants had been pulled up and destroyed, the breeding place for the aphis would not exist, and the newly planted crop would be, practically speaking, free from pest.

We very often see a grower plant a piece of land which was covered with healthy weeds and at once start to plant all kinds of small crops in the field. The seeds sprout and suddenly disappear and Mr. Grower can't understand what is killing the plants. He calls in the Bugman, who shows him some fine fat cutworms. Nature had provided a feast of weeds for this pest, but Mr. Grower destroyed the food and planted new food. Had he any knowledge of clean culture methods he would not have allowed these weeds to grow long enough to attract the cutworm; also, he should have plowed the weeds under several weeks before planting his crop, so as to starve the cutworms or prevent their development.

No matter where we go or where we look we find some cause for all the trouble with our fruits, plants or vegetables. The other day a shipper received word from the Coast that his bananas had to be fumigated on account of scale insects. He said: "Just think of it, bananas infested with scale, never heard of such a thing before, thought that only trees could be infested with scale." Well, he wanted me to go and take a look at the plantation. I told him that I knew of three species of scale insects infesting the banana plant and fruit and that we would probably find the plantation badly infested, if the scale had been found plentiful on the fruit. Just as I had expected, the plants, in fact the whole grove, was in a terrible condition. Old stumps had been left standing, the dry leaves were hanging over the old and new growth and were all badly infested with scale insects, which, as the leaves dried up, readily crawled to the new leaves and to the forming bunches. The existing condition was absolutely unnecessary and the chances of re-establishing a clean plantation by the application of clean cultural methods should be a very easy task, but it must be done on a thoroughly systematized plan.

To illustrate how important clean cultural methods are, I may mention that the cotton growers, who, under ordinary conditions lose from 50% to 75% of the cotton crop, owing to the serious attack of the cotton boll worm (*Celechia gossypiella*), can and have proved, that by collecting the affected bolls, or on a larger scale by pruning the cotton plants, removing all infested bolls and the late stragglers which generally harbour the cotton worm, the pest can be reduced to a very small percentage.

Clean cultural methods, when carried out in conjunction with spraying or if carried on where the natural enemies of the various pests abound, always show a decided improvement owing to the action of two or three factors working together, but clean cultural methods alone will do much toward a very good check on some of our worst pests. The old saying, "An ounce of prevention is worth a pound of cure," is as applicable to man in relation to insects or fungi which injure his crops as to other matters which affect his well being. The enterprising grower who employs practical methods for the control of insect-pests which menace his crops has a distinct advantage over one who does not. He is enabled to obtain a good yield while the careless grower only gets loss and disappointment. Eternal vigilance is the price of a good crop, especially in a country where the summer season always prevails.

Co-operation in the control of pests is another feature of success and should be instituted on business lines. The greatest damage to a thrifty farmer or grower is very often caused by his negligent and indifferent neighbour. It does not seem just to the clean culture grower that his next door neighbour should be allowed to breed all kinds of pests which soon find their way to his clean farm, and it is not just and should be remedied. The careless banana grower should not be allowed to produce scale infested fruit which when sent to the outside market is held up, fumigated and condemned, and will, if such infested fruit is permitted to be shipped, probably stop a good and paying industry. Steps should be taken to protect the industrious, clean culture practising grower by regulations which can be used to make those who do not protect their own crops abate their nuisance and thereby check the promiscuous breeding of all kinds of pests.

Costa Rica Coffee Crops Decrease.

According to recent statistics the coffee crop of Costa Rica for the year just ended was estimated at 206,609 sacks, weighing 12,641, 156 kilos (kilo—2'20 pounds), this crop being 1, 775,770 kilos less than that of the year before. The amounts exported were as follows:—

	Sacks.
England	169.382
United States	16,652
Germany	13,843
Other countries	6,722

The mean price obtained in 1910—11 was 25'84 colones (colon - $0'465)
—*Bulletin of Pan-American Union.*

British West Indies Trade.

A Booklet entitled " West Indies in Canada" was recently published by the Imperial Department of Agriculture for the West Indies, primarily for the purpose of placing manufacturers and merchants in Canada in possession of reliable facts and statistics about the British West Indies and British Guiana. Trade to the value of £8,896.758 was done between these two countries and Canada in 1910, Canada importing 7,118,960 and exporting 1,677,798 to them. Through the courtesy of the *Canadian Grocer* this paper is enabled to take from the pamphlet extracts relating to articles of special interest to the readers of the Spice Mill.

Coffee.—The coffee plant is a bush with dark-green leaves and white flowers. The ripe fruit is a fleshy berry containing, usually, two seeds face to face. The flesh is removed by a suitable machine and the dried seeds form the coffee been of commerce. "Blue Mountain" coffee of Jamaica has a wide reputation. Coffee was exported from Jamaica in 1909-10 to the value of £127,120.

Coffee, during the early part of the last century, was largely cultivated in the country of Barbice. About the time of the cessation of slavery, circumstances necessitated the gradual abandonment of the cultivation. About the present time 2,300 acres are occupied with coffee the Arabian or so-called Creole kind, and the Liberian sort being the principal varieties under cultivation. Robusta (or Java) coffee is being planted on a small scale in some localities. Large acres of land in British Guiana are well suited to the growing of coffee but low prices have kept any considerable acreage in check. The quality of British Guiana is excellent and it always commands a relatively good price.

Cacao.—Cocao and chocolate, which are familiar to all, and are becoming more and more to be considered among the necessities of life, are prepared from the seeds, or so-called beans, of the cacao tree *Theobroma Cacao.* The tree does not grow very large and the flowers and fruits are borne on stout stalks on the trunks and larger branches. The fruits, which are large pods, are collected when ripe and cut or broken open. The seeds are put into large bins, where they sweat and ferment for some time. Then they are washed, cleansed and dried.

The cacao tree is eminently a tropical plant and one that requires careful attention and intelligent cultivation, in order to produce the best yields. Much improvement has recently been made in all the processes connected with the industry. Formerly all cacao growers depended on the heat of the sun for drying the beans, but within the last few years very satisfactory driers, using artificial heat, have been placed on the market and they are coming into general use. In addition to the cacao and chocolate, cacao beans also yield a large percentage of fat, or cacao butter, which is used in a variety of ways. The total value of the cacao exports from the West Indies is about £1,400,000, principally from Trinidad and Grenada. The exports of cacao from Jamaica, Dominica and St. Lucia are increasing.

Cassava Meal.—The meal obtained from the fleshy roots of *Manihot utilissima* (Spurge family). It is perfectly wholesome food. It is also known as cassava fraine, and makes good cakes, biscuits, etc., which should be lightly baked, buttered and eaten fresh. Indians in the interior of British Guiana live almost entirely on Cassava. Tapioca is obtained from the same plant by heating the starch on hot plates and stirring with an iron rod. The starch grains burst, some of the starch is converted into dextrin and the whole agglomerates into small, irregular masses. The roots of the sweet cassava may be boiled entirely and used as a vegetable.

Cassia fistula.—An ornamental tree 30 to 50 feet high. The pods contain a large number of small seeds embedded in a pulp that is used in medicine. The bark is a source of tannin and is in considerable demand in some parts of India for tanning purposes.

Chillies or Capsicums.—The acrid, biting fruits of small shrubby or herbaceous plants of the genus Capsicum. They are principally used as a condiment and in medicine. Cayenne pepper consists of the pulverized fruits of the small pungent varieties. Cultivated in Nevis and at several of the West Indian botanic stations.

Ginger.—The underground stems of *Zingiber officinale*, a near relation of the arrowroot and banana. The stems have to be very carefully cured, an operator requiring considerable skill. Jamaica is the main seat of the ginger industry in the West Indies, £43,581 worth being exported in 1908 9. . . . . •

Kola Nuts.—The seeds of a small tree, a native of West Africa and naturalized in the West Indies. They are used in the manufacture of several beverages. When eaten they reduce the rate of waste of the tissues, and thus enable a person to go without food for a long time. Produced in Jamaica, British Guiana, Grenada and Dominica.

Nutmegs.—The seed of *Myristica fragrans*, a native of the East Indies. Grenada exports about £30,000 worth of nutmegs yearly. The ripe fruit of a nutmeg is not unlike a peach in appearance, when growing. As it ripens, however, the thick outer covering splits open, disclosing the brown seed and the brilliant orange-red mace. A tree in full bearing is a very handsome sight.

Pimento (Allspice or Jamaica Pepper). The allspice of commerce is the fruits of the tree *Pimenta officinalis*. When gathered, they are little, black, unripe berries. They are spread out in a thin layer and cured in the sun, an operation taking about six days. They must be dried quickly, before the flavour has time to deteriorate. Exports from Jamaica in 1909-10 were worth £68,351. . . .

Tea.—The dried leaves of *Camellia Thea*, a plant that is a native of Assam and probably also of China. Black and green teas are prepared from the same plant by peculiar methods of drying or curing. There are probably at the present time only two tea plantations in the Western hemisphere, one at St. Ann in Jamaica and the other in South Carolina. In Jamaica there are now from 80 to 90 acres under tea cultivation.

Vanilla.—The vanilla beans of commerce are the seed "pods" of climbing South American orchids, *Vanilla Planifolia*, and other species. The curing of the bean demands great skill. This cultivation is receiving careful attention at the botanic stations at Dominica and elsewhere.—*Spice Mill.*

"RUBBER BOOMS ARE FINISHED."

Mr. J. A. Henderson, chief partner of the firm of Messrs. Henderson & Co., who returned from home recently, was interviewed by a *Ceylon Observer* representative. Mr. Henderson said there was a considerable amount of rubber orders coming in from America just now in addition to the ordinary English trade and that accounted for the differences in the price of rubber. This year's price, he said, will be fairly steady and also possibly next year; "after that, who knows," he added. "Contracts made ahead for 1913 have already made about 5s. per lb.

The slump in rubber, said Mr. Henderson, is due to a variety of things, but it is chiefly due to the fact that people are very nervous, having been badly hit by wild cat schemes and so have lost confidence for some time.

"And is there likely to be any improvement in the market at all soon?" —"Well, I do not think there will be another boom." Mr. Henderson also stated that there were no flotations at all at present, neither did he know of any that were contemplated. A feature of the market at home at present was Nigerian tin, which appeared to be attracting a good deal of attention. "I do not think," he said, "that people will put any more money in rubber just now." "Is there any fear from overproduction?"—"People are very nervous as to what will happen in three years' time from now."

"And that, of course, accounts for the present hesitancy, and the quiet conditions?"—"Of course."

The Planters' Chronicle.

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THE U. P. A. S. I.

(INCORPORATED.)

The Scientific Officer.

Mr. R. D. Anstead, B. A., returned to headquarters this morning on the completion of his brief tour in Coorg.

Proposed Bonus on Green Tea.

Mr. J. Carson Parker has submitted to the Chairman his report of the proceedings of the meeting of the Indian Tea Cess Committee which he attended for the purpose of pressing for a revival of the Bonus on Green Tea. This report must, however, be held over until the next issue of this paper.

A Still for Camphor.

Mr. J. J. McKenzie, of Nadavatum, writes as follows:—The Engineers say that they are unable to furnish an Estimate of the camphor distillator kindly described by Mr. Anstead on pages 72 and 73 of the Annual Report. They would require drawings of the distillator. Could Mr. Anstead add to his kindness by procuring the necessary drawings?

American Tea Board's Tests.

A New York paper states that the test for teas which has been decided upon by the Board in that city was explained recently to Mr. Secretary MacVeagh.

" A messenger was sent out to buy a large number of samples of teas at ordinary stores about town. These were brought to the Secretary's office and the new test was applied. The results were found satisfactory. The object of the new test is that of simplifying the operation of testing as much as possible, at the same time keeping it sufficiently rigid. It consists in first shaking out the dust from the samples. Then the remaining substance is pressed against coloured papers of various kinds and a microscope is applied. The colour, if any is present, shows a stain on the paper. Those importers who have been censulted agree that the test is a good one. It is a development of the old test, and while there is nothing final about it is the one which will probably be adopted. The method contains no chemical elements but is purely physical. The statement is unofficially made that next year there will be no attempt to describe the samples, but that they will be simply prepared and sent out to various ports. Then the teas will be tested there by comparison with them. The new test will be used as indicated. It is not intended to lower the standard of teas below that which has prevailed in practice during the past year."

Scientific Officer's Papers.

XCVII.—THE MANURIAL VALUE OF NATURAL MULCH ON COFFEE ESTATES.

I have recently had the pleasure of reading the late Mr. Pringle's book 'Science and Coffee' reprinted from the *Madras Mail* and I find that in it he sounded the same note of warning as I have done in a report on a visit to South Mysore (Sc. O. Paper No. 50) as to the possible danger of applying too much Nitrogen to Coffee. In that report I said: "With regard to manuring there is a possibility that too much Nitrogen is being applied and the trees thus induced to make wood and leaf instead of flower and fruit. Undoubtedly many fields do require Nitrogen, and humus, but well established fields with a heavy surface mulch which are annually given doses of Nitrogenous manures, such as Poonac and Fish, may be getting an over stimulus of Nitrogen, and it may be advantageous to reduce this and apply Nitrogenous manures less frequently."

Mr. Pringle goes into the matter far more thoroughly and quotes an American authority to enforce his argument, and I quote what he says as a fitting introduction to the investigation that I have recently carried out, with the help of Mr. C. K, Pittock, as to the actual amount of Nitrogen and other plant food annually added to the soil of a coffee estate by the leaf fall from the shade trees. Mr. Pringle says:--

"Why do the trees, when all the conditions are favourable, not yield a crop proportionate to the blossom that came out? This subject has commanded my attention for the last five blossoms in South Coorg, all of which I have seen, and in no case has the crop been equal to the show of flowers. Then again, one of the most surprising and perplexing results of my experiments was the fact that the unmanured plots were superior to the manured estate, and not much inferior to the manured plots. The question was evidently one of nutrition, and I was forced to the conclusion that the season at which the manures were applied had a most marked effect on the yield of crop. A study of the effect of nitrogen on plants throws much light on the subject, and I may, therefore, quote from the Bulletin of the New York Agricultural Experiment Station the following:—

> "The influence of nitrogen in its various forms upon plant growth is shown by at least three striking effects. First, the growth of the stems and leaves is greatly promoted, whilst that of buds and flowers is retarded. Ordinarily most plants, at a certain period of growth, cease to produce new branches and foliage, or to increase those already formed and commence to produce flowers and fruits, whereby the species may be perpetuated. If a plant is provided with as much available nitrogen as it can use just at the time it begins to flower, the formation of flowers may be checked, while the activity of growth is transferred back to, and renewed in, stems and leaves which take on a new vigour and multiply with remarkable luxuriance. Should flowers be produced under these circumstances, they are sterile and produce no seed. Second, it deepens the colour of the foliage, which is a sign of increased vegetable activity and health. Third, the relative proportion of nitrogen in the plant is increased in a marked degree."

"Now it is evident if the foregoing is true, and it is supported by the evidence of the first agricultural scientists of the day, the question of the supply of nitrogen to the coffee plant is of the greatest practical importance to the planter. The tree must have nitrogen, especially where leaf disease is virulent, but there must not be an excess when the plant blossoms, or the blossom will not set. The coffee planter wishes his plants to seed and, as a rule, the tea planter does not, so the rule of manuring must be inverse. It is evident that in South Coorg if a nitrogenous manure is applied just after crop it will be brought into action by the showers that start the blossom, and this is enforced by the fact that manuring in August and September gives better results, and that the plots with no manure yield better than the estates manured just after crop. Not only must the time at which the manure is applied be carefully regulated, but the quantity also. We have seen that an excess of nitrogen was fatal to supplies; we now see that it is equally fatal to the blossom when it is applied at the wrong time."

In my Report quoted above, it was stated that, Experiments were being conducted to ascertain how much Nitrogen is being supplied annually by the natural mulch supplied by the coffee leaves and the leaves of the shade trees, and to discover what the results of the manurial experiments conducted by Dr. Lehmann which showed in every case that the so-called "unmanured" plot gave as good, or better, yields as the manured plots, really mean. These plots were not really unmanured but received large doses of nitrogen and other plant food from the mulch.

The shade trees send down their roots deep into the sub-soil and there they secure mineral food which passes up the trunks into the boughs and leaves. In all the leaves which fall is a certain amount of plant food, Nitrogen, Potash, and Phosphoric Acid, and especially Lime, which is the substance which remains behind in chief quantity in the shrivelled leaf.

These leaves are acted upon by fungi and bacteria and they soon rot down under their action and form a layer of humus which is worked into the top soil by worms and insects. Here the soil bacteria decompose it, they being the indispensible agents in breaking down humus and supplying simple compounds of nitrogen to higher plants. They may perform the work economically or wastefully, depending upon conditions which are largely controlable.

Plants take most of their nitrogen in the form of nitrates, which are very simple substances compared with the nitrogenous compounds existing in the mulch and humus. The change from the complex nitrogenous compounds in the humus to the simple nitrate cannot be brought about by any single kind of bacteria, and there are at least three well defined steps in the process each brought about by a different species of bacteria. The first step is the production of ammonia from the proteids of the humus, the second step is the changing of this ammonia into nitrites, and the third and last step the changing of nitrites into nitrates.

The rapidity with which this change goes on is determined largely by climatic conditions. The nitrifying bacteria, as these three kinds of bacteria are called, must have sufficient moisture and a favourable temperature for their development, both of which are present in a Coffee Estate. They must have an ample supply of humus as a source of nitrogen and they will not develop in the absence of Lime which serves to neutralise the nitric acid formed. In the absence of basic substances like Lime the nitric acid produced by the bacteria accumulates and acts injuriously on them, retarding their development.

(To be continued.)

RUDOLPH D. ANSTEAD,
Planting Expert.

DISTRICT PLANTERS' ASSOCIATIONS.

South Mysore Planters' Association.

Minutes of 48th Annual General Meeting held at Mudigere on March 28th, 1912.

PRESENT.—Messrs. E. M. Playfair, (President), W. S. Crawford, G. Foster, Hon'ble Mr. J. G. Hamilton, F. M. Hamilton, (Hon. Secretary), C. J. Hayward, P. Hunt, V. Hunt, C. Lake, A. R. Park, C. K. Pittock, W. F. Scholfield, S. Sladden, K. Thammayer, M. J. Woodbridge.

The President opened the meeting with the following address :—

The Honorary Secretary and Members of the South Mysore Planters' Association :

Gentlemen,—The year which has just closed was the 48th of the existence of this Association and must be considered a red letter year and one of progress, seeing it is the advent of the employment of an Assistant to our Scientific Officer who will commence work in May next.

Further a council of Associations has been formed which will facilitate the conducting of business in connection with the Associations. A President and Secretary have been elected who will go into all matters regarding pay, management and allowances to Scientific Officer's Assistant. It is proposed to form a permanent council of 3 members and if this meeting is in favour of this proposition members from the S. M. P. A. should be elected now.

A Hybridisation Farm has been started, and this is a most important step. I do not know if all of you are agreed on this point, but I myself am perfectly convinced that a good Hybrid in Mysore will do for us what the Coorg plant did over 30 years ago and it behoves every one of you to give this your greatest attention.

Planters' Benevolent Fund.—This year receipts have been issued by the U. P. A. and in future will be administered in a more satisfactory manner. A first report is to be given to Delegates at the next U. P. A. Meeting.

Our Honorary Secretary wrote to the Dewan with reference to Land Tenure, Saklaspur, Sub-divisional and Emigration Bill, a copy of the latter was sent and is on the table and discussion is invited. A general reply has been received to the other matters.

Railway extension to Hassan from Mysore and to Arsikere has been sanctioned; and from Kadur to Chickmagalur. I understand the Kadur District Board has agreed to an increased cess to enable this latter to be undertaken. This, gentlemen, is the only real progress the Mysore State has made in this vicinity in the last 30 years.

Rules have been printed, it is necessary to alter them. 1st, to meet the difficulty of a quorum. 2nd, to make the subscriptions clear. 3rd, it is to be proposed that only 1 member should be sent by this Association to the U. P. A. meeting and that his expenses should be paid.

Labour Laws.—The attention of members is called to the practical certainty of their delegates to the U. P. A. meeting having to give a decision on this question and it is proposed some member be asked to draw up a scheme which this Association can accept and which is likely to be acceptable to the other delegates at the U. P. A. meeting, both as regards crimping and Registration or other legislation for the better regulation of labour. No meeting has taken place between Association representatives and so far the individual Associations have given no decision ; matters might be referred to Council of Members of Associations.

New Member.—Mr. A. Thomson is up for election.

Dassara Assembly.—Your delegate had an interview with the Dewan, who was sympathetic, and asked that this Association should communicate with him regarding Emigration Act, Saklaspur Sub-Division and Medical affairs, all of which has been done, the result is a *little* has been done; we were promised a medical officer in Mudigere with a degree and I understand he has taken up his appointment.

Coffee Cess.—Has been refused by Government.

Wages..—This is an important subject on which I do not wish to speak at length as it is a matter for discussion, it affects *all* planters, members, non-members, Indian and Europeans, and they should take a serious and common sense view of the raising of pay, and advances. I will only say that it appears likely coolies' pay in some way or other *must* be raised if we are to keep our labour, the form it will take should be agreed to by *all*, personally I am against raising pay and would ask you to say to yourselves: "If pay is raised and price of coffee again falls, how are we going to carry on ?"

In conclusion I have to congratulate all present on the prosperous state of the coffee market, and trust it will last for a long time. I now place my resignation in your hands and tender you my very best thanks for the honour you conferred on me, by electing me your President. I especially beg to thank your Honorary Secretary, for without his assistance I should have been quite useless.

(Signed) E. M. PLAYFAIR.

28th March, 1912.

The Honorary Secretary then read his report.

Gentlemen,—The accounts for the year are before you, have been audited, and show a balance of Rs.54-5-8.

There is still due a/c subscriptions	...	Rs.240	0	0
Do do old balances	...	„ 50	0	0
Do do P. B. F.	...	„ 60	0	0

This latter is not correctly a fund to be dealt with in Association accounts but has always been kept with them.

There are now 35 members on the Association, 31 representing 41 Estates with a planted area of 6,708 acres and 4 members paying a personal subscription. One member resigned after paying ½ a year's subscription and one new member representing 100 acres is proposed. This gentleman has been considered a member for the past six months and is willing to pay the ½ year's subscription when called on.

Accounts.—At last year's U. P. A. Meeting your Delegates guaranteed on behalf of Association Rs.1,500 a year for five years towards an Assistant Scientist. The Executive were called on in conjunction with the other Mysore Planters' Associations to find money for the expenses of Assistant up to 30th June next and agreed to find Rs.750: of this sum, Rs.400 has already been paid and Rs.350 is still due. Five Coast Curing Firms who guaranteed Rs.250 a year to the Honorary Secretary have been asked to make their guarantees to U. P. A. direct, and have done so.

Hybridization.—Your delegates also guaranteed up to Rs.75 for the Hybridization Farm on the Nilgiris. We have so far not been called on to pay anything on this account.

Both these guarantees received the sanction of Association at a Meeting held on 25th September.

P. B. F.—There are 24 number of the Planters' Benevolent Fund, of whom only 18 have paid their subscriptions for 1911-12.

Messrs. Peirce, Leslie & Co., Ltd., of Cochin, paid Rs.250 to this fund on 11th July 1910. I would ask whether any member of this Association knows about this matter. Was the amount a donation a/c S. M. P. A? or do Messrs. Peirce, Leslie & Co. intend appointing beneficiaries?

After considerable discussion on the accounts the original budget was accepted with the exception that the allowance towards the expenses of the U.P.A. delegates was reduced to Rs.100.

The following resolution was passed: —

Proposed by Mr. C. Lake, seconded Mr. C. J. Hayward: "That a reserve fund be started by this Association to safeguard it against any possible deficiency in future balance sheets.

SUBSCRIPTION TO THE U. P. A.

A very clear explanation of the position of the Mysore Associations was given by the Honorary Secretary, and the Meeting passed the following resolutions:—

Proposed by Hon'ble Mr. J. G. Hamilton.

Seconded by M. J. Woodbridge:

That the Honorary Secretary be empowered to consult with the N. M. P. A. and B. P. A. with a view to bringing the U. P. A. subscriptions of the three Associations to a uniform basis of 2 annas per acre, and that should an agreement be arrived at on this point, he be empowered to raise the contribution of this Association to the Assistant Scientific Officer to a point which will bring it to a uniform level per acre with those of the N. M. P. A. and B. P. A. provided that he is limited to a maximum of Rs.2,000 per annum.

ASSISTANT SCIENTIFIC OFFICER ESTIMATES.

This gave rise to a long discussion as there seemed to be a considerable difference of opinion but eventually the revised estimates of the Council of Mysore Associations were agreed to.

COUNCIL OF MYSORE PLANTERS' ASSOCIATIONS.

The Rules as drawn up at the Council's meeting held in Mudigere last month were considered and approved.

LABOUR.

A long discussion took place on a suggestion that some form of registration of maistries be adopted by the Association and a resolution proposed by M. J. Woodbrige and seconded by F. M. Hamilton: "that a Committee "be appointed to draw up a scheme for Registration of Maistries to be "brought before the next General meeting of the Association," was passed and

C. J. Hayward, W. L. Crawford and M. J. Woodbridge were appointed as a Committee for this purpose.

ASSESSMENT.

Mr. W. L. Crawford proposed and Hon'ble Mr. J. G. Hamilton seconded :—That the Mysore Government be approached to amend their Order No. 1125-8 dated 22—9—1885 with reference to granting a permanent title for coffee land, as it is manifestly unjust to ask the purchaser who has recently acquired land, adjacent to his property, from a neighbour, who held the same on the Rs.1 tenure to pay up 30 years or more back tax at 8 annas per annum per acre.

Mr. Crawford also proposed and Mr. Woodbridge seconded: " That this Association is of opinion, that as it has been proved that Pará Rubber cannot be grown profitably and Ceará Rubber is still in its infancy in South Mysore, Government be approached with the suggestion that the cess to be levied on lands granted for Rubber cultivation should not exceed that levied on coffee lands." Both these resolutions received the unanimous approval of the meeting, and Mr. Crawford was asked to approach Government on behalf of the Association.

MYSORE EMIGRATION ACT.

This was read and discussed.

NEW MEMBER.

Mr. A. Thomson was elected a member as from 1st October.

PLANTERS' BENEVOLENT FUND.

It was pointed out by the Honorary Secretary that every member of the Association should support this fund.

RAILWAYS.

This Association notes that the Mysore-Arsikere-Hassan line is sanctioned and that the Kadur District Board is in favour of a cess to guarantee interest on the Kadur-Chickmaglur line, but considers that no Railway programme will be complete until a Railway from Arsikere to Mangalore is made.

ELECTION OF OFFICERS.

The following gentlemen were elected for the coming year.

President	F. M. Hamilton.
Honorary Secretary...	M. J. Woodbridge.
Committee	C. J. Hayward.
	P. Hunt.
	J. G. H. Crawford.
	W. L. Crawford.
	C. K. Pittock.
	W. T. Scholfield

The Hon'ble Mr. J. G. Hamilton spoke at some length on the loss to the district caused by Mr. E. M. Playfair leaving for good and wished him good luck in his new venture on behalf of all the members of the Association.

After a reply by Mr. Playfair, the meeting closed with a vote of thanks to the Chair.

(Signed) M. J. WOODBRIDGE,
Hon. Secy., S. M. P. A.

CORRESPONDENCE.

Rubber Spouts.

In these days one hears so much detail regarding quality of sheet and rubber generally, form of coagulation, systems of tapping, that it is curious, that one hears so little regarding a most important and economical little rubber accessory, known as the Rubber Spout. Although, as I say, one hears little concerning Spouts and the correct type to use, a few who have realized the importance of this accessory, have pursued the evolution from the "Tin Drip" stage and are now responsible for a practically perfect Spout!

Looking into the history of the spout, we find that the first stage was the Tin Drip, followed shortly afterwards by the introduction of the oblong piece of Tin, which had to be bent by the cooly and knocked into the tree with the handle of the tapping knife. These spouts became rusty and quickly buckled up under the repeated knockings. However, a further stage in development was reached on the introduction of the same shape of spout made of galvanized sheet metal—this resisted the repeated knockings and also the rust to which the tin spout was subjected. Those responsible for development found that this did not answer all requirements—so a "lip" was introduced, and this was certainly a great improvement on the flat piece of tin, but the knockings had not yet been surmounted. Nothing has been put forward until quite recently, that was in any way superior to the galvanized lip spout. But we have now entered upon what appears to be a final development (at least for some time) as a spout which combines the hard galvanized metal and has a "lip" and a serrated edge at the opposite end to the lip, eliminates all necessity for knocking, the spout being simply pushed in with the hand. The teeth at the serrated end are sufficiently long to allow the spout to take a firm grip but not long enough to injure the tree in any way. It answers the requirements of the most fastidious, as a Dust and Bark proof cover is attached at a slight additional cost. Although this spout is only about to be introduced into India and Ceylon it is well known and largely used in the Straits, and as soon as Managers and Superintendents of Rubber estates see it here, they will realize its economical value. The spout is patented in all countries. Messrs. Walker, Sons & Co., Ltd., are appointed Agents for India & Ceylon.

Yercaud, (Sd.) P. J. A. WILLIAMS.

Ceara Rubber.

Is it advisable to plant up and exploit Cearà & will it pay?

As you invited correspondence on planting matters, I take the liberty of making use of your offer on a matter which I believe is still exercising the minds of many planters in South India, *i.e.*, is it good policy to plant up Ceará? That Ceará will grow almost anywhere is known but what is not generally known, is whether a really satisfactory and economical method has at length been evolved of tapping the tree which leaves a margin for profit; on this point, which is after all the main point, the opinions and the experience on plantations seems to be very conflicting.

Mr. Wicherly and others are enthusiastic about this Manihot and advise planting up extensively and several methods of tapping are suggested, but as far as I can gather none have *proved* really satisfactory from a planters' point of view. In reviewing Mr. Wicherley's book in the *Chronicle*, I notice Mr. Anstead says that in Coorg all difficulties have been practically overcome—without the use of the pricker; might I suggest that a detailed description of this be published and the results obtained, if that be possible?

I believe many readers of the *Chronicle* will welcome this.

T. K.

MEMORANDUM.

Australian fruit trees do much better in India than those imported from European Countries on account of similarity of climate and coincidence of season. It is intended to import a large number direct from Australia and distribute to intending growers immediately on arrival about the beginning of July or August. Before sending in the indent it is very necessary that some idea should be had as to the approximate demand. Will therefore ladies and gentlemen who are desirous of trying the plants oblige by informing the undersigned before the 20th April, 1912, the kind, variety and number of fruit plants they want, stating their address in full and the Railway Station to which the parcel should be booked.

(Signed) G. H. KRUMBIEGEL,
Economic Botanist,
Superintendent, Govt. Gardens.

Govt. Botanical Gardens,
Lal-Bagh, Bangalore.
Dated 6th April, 1912.

LIST OF FRUIT TREES INTENDED TO BE IMPORTED FROM AUSTRALIA.

APPLE.

Price Rs.1-4-0 each.

Adam's Pearmain
Allington Pippin
Blenheim Orange
Cox's Orange Pippin
Devonshire Quarrenden
Cleopatra
Golden Reinette
Herefordshire Beefing
„ Pearmain
Jonathan
Kentish Fillbasket
Munroe's Favorite
Northern Spy
Reinette du Canada
Rome Beauty
Sturmer Pippin
Worcester Pearmain
Browning's Beauty.

APRICOT.

Price Rs.1-4-0 each.

Belle de Toulouse
Blenheim
Campbell Field Seedling
Early Moorpark
Oullin's Early Peach
St. Ambrose
Moorpark on Peach
Large Early on Peach.

CHERRY.

Price Rs.1-8-0 each.

Bedford Prolific
Bigarreau Napoleon
„ Twyford
Early purple Guigne
Florence
St. Marguerite,

ORANGE.

Price Rs.3-0-0 each.

St. Michael's
St. Iago
Washington Navel.
Paramatta
Siletta.

SHADDOCK ... ... Rs.3 each.
LEMON ... ... Rs.3 each.

GRAPE VINE.

Price As.12 each.

Black Alicante
Gordo Blanco
Muscat of Alexandria
Muscat Hamburgh
Sweet water.

NECTARINE.

Price Rs.1-4-0 each.

Elruge
Goldmine
Hunt's Tawny
Red Roman
Irrewara
Stanwick.

PLUM.

Price Rs.1-4-0 each.

Coe's Golden Drop
Greengage
Peach Plum.
Washington
Magnum Bonum, yellow.

PLUM (Japanese).

Price Rs. each.

Abundance
Kelsey
Wickson
Burbank
Satsuma or Blood Plum.

PEACH.

Price Rs.1-4-0 each.

Early Rivers
Lady Palmerston
Royal George (Clingstone)
Royal George (Free Stone)
Red-Leaved
American Noblesse.

PEAR.

Price Rs.1-4-0.

Beurre Fonqueray
Winter Bartlett
Williams Bou Chretien
Jargonelle
Kiefter's Hybrid
Louise Bonne of Jersey
Marie Louise

JAPANESE PERSIMMON.

Price Rs.2-0-0 each.

Die Die Maru
Oushin
Pictiris
Kurokumo
Oonochen
Tanachi
Among
Seedless
Hyakume
Haycheya
Jubilee

ALMOND.

Price Rs.1-4-0 each.

Brandi's Jordan
Hatch's Nonpareil
Paper Shell.

DEWBERRY LUCRETIA MAMMOTH ... Price Rs.0-12-0.

MEDLAR.

Price Rs.2-0-0 each.

Nottingham
Royal.

RASPBERRIES.

Price annas 4 each.

Hunter's Perfection
Fillbasket Thornless.

BLACKBERRY.

Price Re.0-8-0 to Re.1-8-0 each.

Mammoth
Italian Cut-leaved
Lawton's.

WALNUT.

Price Rs.2-0-0 each.

Japanese Sieboldii
Dwarf Prolific
Common.

CHESTNUT.

Price Rs.2-0-0 each.

Japanese Mammoth
Spanish.

Note.—Currants and Gooseberries have been omitted as their thriving is doubtful.

The prices quoted above are only approximate, delivered at the Lal-Bagh, Bangalore: all charges for packing and forwarding to destination would be extra.

REPORTS OF COMPANIES.

Indian Peninsula Estates.

The Secretaries of the Indian Peninsula Rubber and Tea Estates. Limited, have issued a lengthy circular to the shareholders, containing extracts from the reports of the visiting agents. The estates were visited at various times during last year by Mr. E. F. Barber, of Messrs. Barber and Pascoe, and the details now given were sent after his last round of visits. In the course of his report Mr. Barber says:—"The Hallacarry and Dolphin Estates adjoin, and can be taken as one. As far as present production goes, they are entirely coffee. Rubber has been planted through part of Hallacarry but it need only be considered on about 100 acres. For the present coffee season the estimate is 20 tons. Dolphin bore heavily last season, and there is no crop to speak of there or in the upper part of Hallacarry, but the middle and lower parts are bearing fairly well, so I think the estimate is safe. The (tappable) rubber trees are scattered, and the ground is difficult to an extent that will make harvesting expensive, but, apart from this, the steep lie of the land and the amount of rock about would make tapping a source of danger to the younger trees. A few trees show what the development may be in time, and I think it would be wiser in every way to leave it alone until a fair proportion of trees in each acre are fit for tapping." (Directors' note—On this recommendation tapping has been postponed for the present).

"On the Manalore Estates the rubber is uneven and scattered, but there are a fair number of well-grown trees in certain blocks. The number of tappable Pará is estimated at 970, and Ceará at about 400." (Directors Note:—The Directors consider this to be the most dfficult estate to work, on account of the difficulty experienced in securing labour and its isolation from the company's other groups, and in consequence of this effortg are being made to arrange the leasing of this property to a neighbourins estate while the rubber is developing).

"At the Hawthorne group (Shevaroys Estate) the Pará rubber was first planted in 1898, and since then has been planted regularly. The growth is slow, and under favourable circumstances it may be taken that six to eight years are necessary to bring the rubber into bearing. The number of trees in tapping during the current year is 2,200, and the yield to date is 1,345 lbs., giving an average of ·61 lb. per tree. The tapping has been carefully done. The estimate of 2,500 lbs. for 1912 should not be difficult to get with the number of new trees to be brought in. Taking Vanguard by itself, I consider ihe Pará the evenest that the company has, but it is younger than that on Surrenden. Surrenden has a small, compact block of trees in tappingt The total Pará in tapping on the group is 1,360 trees, and the yield to date is 273 lbs., giving an average of 2 lb. per tree. The Ceará in tapping is given at 2,400 trees, and the yield stands at 350 lbs. It must be pointed out, however, that Mr. Reilly (the Superintendent) had labour difficulties, and was unable to tap at the time when the latex might be expected to flow most freely."—*India-Rubber Journal.*

Travancore Tea Estates.

The directors of the Travancore Tea Estates Co., in their fifteenth annual report, recommend a total dividend of 45 per cent. (less income tax) on the ordinary shares, 10 per cent. of which was paid in October last. Out of the profits they propose to write off for depreciation £4,000, to place £350 to rubber development account, £1,000 to Reserve against coolie advances, and to carry forward a balance of £1,700 4*s.* to next year.

COFFEE

London Market.

There is some satisfaction to be drawn from the Board of Trade figures, which show an increase in the home consumption of 123 tons in the first two months of this year, but the fact that the whole of this has taken place in February may suggest that dealers have been anticipating their wants owing to the strike and consequent trouble in moving goods. It is interesting to notice that the whole of the increase in the common descriptions, indicating how the high prices make it necessary to mix a common grade with the finer ones in order to show the grocer a reasonable profit without advancing prices to the consumer. The market has remained strong, for the figures for February, with a very large reduction in the world's visible supply, did not favour any fall in prices. They indicate rather that stocks will continue to be reduced throughout the year. Since the 1st instant, however, the Santos receipts have been on the heavy side, tending to keep the terminal market steady, and very little business has been transacted there. At the auctions Costa Rica and Mysore have been plentiful, but values have been well maintained, and for parcels a little above the ordinary quality full prices have been paid.—*Produce Markets Review*, March 9, 1912.

The Santos Market.

The Correspondent of the *Economist* reported on February 6th from Rio de Janeiro:—

The Santos coffee market, after suffering a very sharp decline in the early part of last month, recovered rapidly towards the end, prices for future delivery running from Rs.7 $150 to Rs.8 $900 almost without a break, while for spot the market rose from Rs.7 $500 to Rs.8 $300 for No. 4 type. When the recovery took place some of the "bears" got frightened, and paid fancy prices for actual coffee to cover their positions. The Valorisation Committee's cable advising that only 700,000 bags would be sold in 1912 was really the cause of the reaction, as nearly everybody was expecting that from 1,000,000 to 1,500,000 bags would be disposed of. The stock of type No. 4 is reported to be very much reduced, so that this grade will be in demand at good prices for some time to come; some traders even believe that there will be a squeeze in March, as the holders of the actual stock of this quality are not anxious to sell, and think that by keeping out of the market now they may be able to corner the position later on. The decrease in the world's visible supply last month has been also a factor encouraging dealers to stand firm, very little coffee having been put on the market since the figures were known.

Heavy rains have continued in the interior delaying receipts somewhat, and very conflicting reports are to hand as to the balance of the crop still remaining. As regards the next crop, the general opinion now prevailing is that it will be about equal to the present, but the 1913-14 crop should be a bumper one. According to the latest private estimates the Rio crop for 1912-13 is not expected to yield more than about 2,500,000 bags. Rains have been plentiful in the interior of the States of Rio de Janeiro and Minas Geraes, which will no doubt greatly favour the growth of the coffee trees. The continued wet weather appears to have caused no damage so far, at least, no pessimistic reports have been spread yet in this sense.

The Planters' Chronicle.

RECOGNISED AS THE OFFICIAL ORGAN OF THE U. P. A. S. I., INCORPORATED.

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THE U. P. A. S. I.

(INCORPORATED.)

Proposed Bonus on Green Tea.

In a letter dated the 9th instant the Chairman writes :—

I enclose a letter I have received from Mr. J. Carson Parker with extracts from the Proceedings of the Tea Cess Committee. As I have said before Mr. Parker did all that was possible to get us the bonus on Green Tea; and the measure of success that attended his efforts encourages us to hope that if the cess is renewed next year our request will be complied with.

[*Inclosure.*]

Kardora Estate, Meppadi Post,
6th April, 1912.

C. E. Abbott, Esq.,
Chairman,
United Planters' Association of Southern India,
Meppadi.

Dear Sir,—Enclosed please find Extract from Proceedings of the Half Yearly Meeting of the Indian Tea Cess Committee held on Friday the 16th February, 1912, (Noon). I regret I could not send you these notes earlier, I have had to wait for the Official copy of the Proceedings, and as you are no doubt aware the Proceedings are "not for publication," but I have permission to send you an extract of same regarding the "Green Tea Bonus."

As you will see in the end I had to alter the proposal put forward by the U. P. A. S. I.—the Chairman said that the Executive Committee had made up their budget allowing a Surplus of Rs.42,000—so I first of all pointed out that the balance of Rs.42,000 referred to by the Chairman would be insufficient to cover the cost of the proposal of the United Planters' Association of Southern India. They asked for a Bonus of six pies per pound on four million pounds of Green Tea, which would require Rs.125,000.

The Chairman said,—He had understood that the amount would be less than four million pounds. It would be within the recollection of those present that this matter had been brought up at their Meeting in February last and that arguments in favour of the proposal had been put forward by Mr A. D. Jackson. After considerable discussion the proposal had fallen through, as Mr. Jackson had been unable to obtain a seconder.

After considerable disscussion I altered the U. P. A. S. I. proposal but the vote went against us.

Yours faithfully,
(Signed) J. CARSON PARKER.

Extract from Proceedings of the Half Yearly Meeting of the Indian Tea Cess Committee held on Friday the 16th February 1912 (Noon).

PRESENT:—Messrs. W. Warrington, (Chairman presiding), J. Mackenzie, (Vice Chairman), Claud Bald, R. Davidson, W. A. Duncan, W. M. Fraser, W. O. Grazebrook, H. Harris, J. Carson Parker, David Pym.

GREEN TEA BONUS.

Mr. Parker said.—Mr. Chairman and Gentlemen.—I do not propose to make you a long speech on the green tea bonus this morning, as I have taken up a considerable amount of your time already this week. I have had the pleasure of interviewing every member of the Executive Committee and I have. through their kindness, been able to get together some interesting facts and figures to take back to the Planters of South India.

At a meeting of the Executive Committee held on the 22nd December last the following note is recorded with reference to the green tea bonus and the fact that it was to be brought up at the Annual Meeetng: "The Committee were of opinion that the industry had now reached the position of being self-supporting, the price to be obtained being satisfactory." In view of that note I felt it was necessary to come up and spend a few days in Calcutta prior to the meeting and explain to you individually our position, as I was quite sure that last year's Committee, when they refused the South Indian Planters' request, were of opinion that it would be easy for the South Indian Planters to get a similar price for their green teas as that being paid for North Indian green teas at that particular period. Up to then, mind you, South India had not manufactured a single pound of green tea, as they had not been in a position to do so. I am also sure that the Committee felt that we should have no difficulty in finding a market for our green tea. Well, since then we have started manufacture and like all beginners we have had to learn. We made mistakes and no doubt some of us made very inferior tea through lack of experience. Still we ourselves believe in the future of the green tea industry, and I may tell you that we still think we can make a success of our venture.

We have an advantage in our favour in South India as against North. I understand that with you the season is about 8 months and that many tea manufacturers do not care to make green tea in the first and the last months of the season, so that the season in North India is really only about six months. We have no non-producing months and can grow tea all the year round, and so are in a position to supply the demand from month to month. This, as you know, is a very important matter where a new article is being produced, as nothing would upset the buyer more than after inducing him to take up Indian green tea, when he asks you to repeat the shipment, you find it impossible to do so, prebably becoause he wants the tea at a time when there is none being grown.

South India also being so close to Ceylon, and a Ceylon firm having started a finishing Factory in Quilon, we are now in a position to make a "standard green tea," and one need only refer to Mr Blechynden's report on his work in the United States of America, to understand the demand which exists for a standard green tea in that country alone; and I am sure this Committee will realise that by assisting the manufacture of green tea in South India, they are not endeavouring to create supplies of an article for which there is no demand, but that they are helping us to capture a share in a large trade which is open to us.

In the United States Mr, Blechynden has from force of existing circumstances been forced to concentrate his efforts in advertising Indian black tea in a country where we know a very large proportion of the tea consumed is green, and our Commissioner in his reports has emphasized the demand for green tea, and has also indicated what the prospects are for it, provided regular supplies can be procured. Another argument which I know you will all agree with is the fact that every pound of "green tea" we make is a pound of tea off the black tea market and therefore strengthens the position of black tea as a whole. Some people, I am afraid, would not agree that there was any point in this, but I know you gentlemen will think otherwise.

To sum the position up, South India at the present moment are putting about a tenth part of their tea crop into green and pioneering the work, and we ask you to help by renewing the bonus, as we are of opinion that one of the chief objects of the Cess fund is expanding the markets abroad, and you cannot expand without a product, can you? By this time next year we hope the industry will be on a different footing to what it is now. For the present we are only pioneering, but with another year's experience we hope to have made a name for our tea, and have got past the pioneering and exploiting part of the work. As we are still at this stage we ask you to help us.

Before I put a formal resolution to the meeting I shall be glad to answer any questions or give any further information that you may require. It may perhaps interest you to know that while the green tea industry of Ceylon is expanding every year, I have been credibly informed up here that North India will not put on the market next year a third of the amount they made last year.

The Chairman said.—Gentlemen,—Mr. Parker referred to the proposal of the South Indian Planters as an effort on their part to exploit a new industry. Well now, we up here have been through all that and so have the Ceylon people, and our experience has been unfavourable to the continuance of the payment of a bonus. During the years a bonus was paid, the largest quantities on which the bonus was paid was 2,136,000 lbs. and that in the year 1905. The quantity then fell off in spite of our offering a bonus until in 1908 it was paid only on 1,143,197 lbs. In view of these figures it was thought unnecessary and inadvisable to continue the bonus. In this connection I should like to read an extract from the proceedings of the meeting of the Executive Committee held on the 12th January, 1909, as follows:—

"It was the opinion of the Executive Committee that the green tea "bonus should be given up. They agreed with the view taken by the majo-"rity of the London Committee, the only argument in favour of its continu-"ance is that it has the effect of relieving the black tea market to the "extent of about 1½ million lbs. annually. But this quantity is more or less "negligible on a total crop of 230 million lbs. On the other hand there "seems to be no prospect of the manufacturing of green tea becoming self-"supporting. Nor does it exhibit any tendency to expansion: on the "contrary, the quantity manufactured each year appears to be dwindling. "In such circumstances it seemed to the Committee to be altogether "inadvisable to continue the subsidy indefinitely."

The prices are fluctuating just as much as in black tea. They are now at a lower figure here than those being obtained in Ceylon for large quantities which I find is 9 million lbs. out of a total of 187. But I think that the position is more hopeful for green tea becoming self-supporting in both places.

Mr. Pym.—I must say that what Mr. Parker has put forward appeals to me, and I am prepared to give him my support and will have much pleasure in seconding his resolution. I think his arguments are perfectly sound, as every pound of black tea taken off the market assists us. I understand his teas are sold for America, and anything we can do to push the sale of Indian green tea in America is all to the good as far as we are concerned. With regard to the conditions of manufacture I understand they are totally different in the South to what they are up here. The bulk of our crop is made in four months or so, the tea comes in rushes here and the climate is not always suitable for green tea. In other words we cannot compete with the South. They make small quantities daily and make the best class of tea, the advantage being that it will be always the same, which is the essence of the whole thing when you are selling forward. We cannot do that here, I know from experience; we tried it in one of our own gardens and had to give it up. I think it would pay the South Indian Planters and I think they are deserving of encouragement more especially as I think if we encouraged them we would be assisting the sale of Indian tea.

The Chairman.—A proposal for a bonus on green tea was brought up last year and the Cess Committee almost unanimously declared against it. I do not put that forward as a reason why we should not give a different vote but the fact remains that a year ago we were of opinion that the bonus would not be given. I would therefore ask you to consider the matter very carefully before you decide to reverse that policy.

I would also like to again remind you that this is probably the last year of the Cess, which will come to an end in March 1913, and we have no certainty that it will be renewed. It seems to me useless that the Southern planters should come to us with such a proposal at this time. Will Mr. Parker give an assurance that they will continue to manufacture green tea after 1913 whether the bonus is continued or not?

Mr. Parker.—Mr. Chairman, you said that we must remember that this is probably the last year of the Cess. The Cess Committee was formed to help people like ourselves who are pioneers in a new industry, and it is no reason because this is the last year that we should not be helped. Then you say that your experience here is not favourable to going in for green tea. Is that a fair argument to put? You people grow tea absolutely under different conditions to ours. You do a small crop here. We are going to tackle the biggest market there is. You ask if Southern India is likely to go on after 1913. Is that a fair question to ask me? I cannot assure you either one way are the other. I cannot commit London Agents and Colombo Agents.

Mr Bald.—I think, Mr. Chairman, that the fact that we threw out a proposal like this last year is not a sufficient reason why we should throw out such a proposal again. The fact of the Southern planters coming forward with such a proposal for a second year should make us give it our serious consideration. I think it may be possible to make a compromise—instead of giving a bonus on four million lbs—give it on two million lbs.

After some further discussion Mr. Parker proposed:—

"That a bonus at the rate of three pies per pound be offered on two
" million pounds of green tea to be manufactured during 1912 and that the
" Executive Committee be empowered to increase the bonus to six pies per
" pound upon such conditions as they think fit."

The resolution was seconded by Mr. Pym. On being put to the meeting there were five members in favour of the resolution and five members against it. In exercise of the power conferred on the Chairman to give a casting vote, he voted against the resolution, which was declared as lost.

Scientific Officer's Papers.

XCVII.—THE MANURIAL VALUE OF THE NATURAL MULCH ON COFFEE ESTATES.

(Continued.)

An experiment has been carried out during 1911 on Baithney Estate, in co-operation with Mr. C. K Pittock, the manager, the results of which it is the object of this paper to describe.

A small plot of average coffee, 66 ft. long by 25 ft. wide, containing 84 coffee trees, was chosen, this being part of one of a number of plots years ago set aside for experiments, and it has received no manure for many years. On the afternoon of the 31st December 1910 this plot was carefully cleared of all the mulch upon it and it was again gone over the next morning and the leaves which had fallen during the night were picked up. During the whole of 1911 the leaves, &c., which fell each month were collected, and spread out to dry for two or three days and then weighed. The bulk was then mixed and a representative sample taken and forwarded to me for analysis. During the monsoon the mulch was artificially dried before it was weighed.

The following six shade trees contributed towards the mulch, being either actually growing on the plot or over-hanging it :—

Grevillea robusta ...	... Silver Oak.
Artocarpus integrifolia	... Jak.
Ficus glomerata ...	... Uttee.
Gmelina arborea ...	... Kuli.
Spondias mangifera	... Gwodden.
Halizarna sp (?) ...	... Tutgherry.

The samples received were well mixed and the moisture still contained in them estimated, and also their Nitrogen content. All figures are based on the ***dry weight*** of the mulch, as it would be impossible to allow for the varying degrees of moisture in the mulch at different times of the year.

The following table gives the figures obtained during the year :—

Month.	Weight of mulch collected on 0·039 acre.	Moisture %	Dry Weight.	Nitrogen %	Lbs. Nitrogen.
January ...	42 lbs. 91 lbs.	8·53	83·2 lbs.	1·12	0·93
February ...	19·5 lbs.				
March ...	29·5 lbs.				
April ...	22 lbs.	9·44	19·9 lbs.	1·19	0·24
May ...	23 lbs.	7·81	21·2 lbs.	0·91	0·19
June ...	19·5 lbs.	7·15	18·1 lbs.	1·61	0·29
July ...	15·5 lbs.	6·48	14·5 lbs.	1·05	0·15
August ...	26 lbs.	7·44	24·1 lbs.	1·26	0·30
September ...	24 lbs.	8·47	22	1·26	0·28
October ...	66 lbs.	8·11	60·8 lbs.	1·26	0·76
November ...	55 lbs.	9·13	50	1·26	0·63
December ...	57 lbs.	7·91	52·5 lbs,	0·91	0·48
Total...	399 lbs.	—	366·3 lbs.	—	4·25

From this it will be seen that a total dry weignt of 366·3 lbs. of natural mulch was collected on the plot during twelve months and that this contained 4¼ lbs of Nitrogen. The area of the plot was just under one twenty-fifth of an acre, viz., 0·039 acre. The figures when worked out for an acre show a total mulch accumulation of 9,392 lbs. (4·2 tons) which contain 108·7 lbs. of Nitrogen. These figures are very large and show at once that the natural mulch is of great value as a fertiliser.

In the table below are given the analysis of a representative sample of the natural mulch collected during the whole year, and the figures calculated from this showing the weight of the different constituents in pounds added to the plot, and in round figures to an acre by its means:—

	Analysis of dry sample.	Lbs. weight on plot.	Lbs. weight per acre.
Organic Matter	85·97	314·8	8072
Ash	14·03	51·5	1320
	100·00	366·3	9392
Containing Nitrogen ...	1·18	4·25	108·7
Consisting of—			
Lime	2·36	8·7	223
Phosphoric Acid ...	0·39	1·4	36
Potash	1·24	4·6	118
Silica	7·68	28·1	720
Oxides of Iron, &c., &c. ...	2·36	8·7	223
	14·03	51·5	1320

The high Silica, (that is insoluble mineral matter) content is no doubt largely due to the dirt gathered up with the mulch, and this was unavoidable under the conditions of the experiment.

All this plant food is added each year to the top soil. It is the decayed leaves of trees, and both the leaves and roots of smaller plants, which add most to the soil. The mulch is worked into the top soil by worms, and by white ants, and other insects, and forms a suitable medium for millions of bacteria which convert the proteids into nitrates available for the coffee, and moreover it is placed where the feeding roots can most readily get at it. The ground just under the mulch is always found to be a mass of coffee feeding roots.

The shade trees supplying this natural mulch differ from field to field and from estate to estate, but the result remains much the same, and if a wide margin be left of say 2,000 to 3,000 lbs. of natural mulch for the average it must be obvious from the analyses above that the addition of plant food is by no means a negligible quantity on any estate using shade trees; and the fact should be emphasised that all old coffee under well established shade is comparable with the plot worked upon in this experiment.

Had the amount of plant food added by the natural mulch each year to an acre been added in the form of the usual fertilisers applied to Coffee it would be represented by a dressing in round numbers of, 15 cwts., of

White Castor Poonac, 150 lbs of Fine Bone Meal and 2 cwts of Sulphate of Potash.

Thus we see that in any scheme of manurial experiment plots no plot which is allowed to receive the natural mulch from the shade trees can be considered as unmanured. It is usual to manure coffee heavily each year with nitrogenous manures, and in the light of the facts given above it is quite possible that the Nitrogen is sometimes out of all proportion to the other plant foods, tending to make the trees produce leaves and wood instead of flower and fruit. It is intended to continue the experiment begun at Baithney along lines which it is hoped may throw some light on this problem. No doubt it will take several years before any results can be obtained upon which a definite opinion can be based, but it appears to be a line of research the necessity for which is indicated and one which may yield valuable information.

My sincere thanks are due to Mr. C. K. Pittock, who has enthusiastically co-operated with me in the work, and also to Mr. C. Lake, who was kind enough to do the field work during Mr. Pittock's absence on home leave and thus to prevent any break in the continuity of the experiment.

RUDOLPH D. ANSTEAD,
Planting Expert.

CORRESPONDENCE.

Ceara Rubber.

Is it advisable to plant up and exploit Ceará and will it pay ?

Sir,—I notice a letter signed T. K. in the last issue of the *Chronicle* asking this question. It is one which could be answered probably in a single year as the result of a systematic experiment. All that is needed is to take a definits area of four or five years old Ceará, count the number of tappable trees on it, measure their girth. and then tap them throughout the whole of a tapping season by some recognised system (good or bad) keeping a careful record of the yield and the cost of working. The figures thus obtained would go a long way towards answering the question, and they would serve as a starting point for any methods of improvement which would make the industry pay. As far as I know, no one has as yet obtained such figures, or if they have they are not willing to publish them.

An account of the tapping system adopted in Coorg will be found on page 67 of Volume VI of the *Chronicle*, but I have been unable to obtain any information as to the improvements which have been adopted or the yields obtained *for publication*.

Figures obtained as outlined above are badly needed for publication *pro bono publico*. Perhaps "T. K." can help me and others.

RUDOLPH D. ANSTEAD,
Planting Expert.

Office of the Planting Expert,
Bangalore, 15th April 1912.

Notifications have been issued authorising Mr. Owen Westall Marden, of Kinnacoorie Estate, the Nilgiris, and Mr. Alexander Donald Macbain, of Pootoo-Mulla Estate, in the Wynaad, to witness the execution of labour contracts under the Planters' Labour Act, 1903.

DISTRICT PLANTERS' ASSOCIATIONS.

Malabar Coast Planters' Association.

Proceedings of the Annual General Meeting of the Malabar Coast Planters' Association held at the Trichur Club on Saturday, the 6th April, 1912, at 4-30 p.m.

PRESENT.—Messrs. A. H. Mead (Chairman,) W. D. Tait, E. Lord, H. C. Plowden, B. F. Bowles, C. Walmsley, E. H. Halliley, D. Radmore. R. de Roos Norman, Honorary Secretary.

By Proxy.—Messrs. E. F. Barber, C. F. Ewart, Aspinwall & Co., Campbell Hunt.

Read and Recorded.—Letters of regret from Messrs. Barber & Pascoe, C. F. Ewart, Campbell Hunt for not being able to be present at the Meeting.

Visitors.—Messrs. F S. Davies, R. Grubb and B. N. Behr.

33. *The Notice calling the Meeting* was read and recorded.

34. *Proceedings of the last Meeting.*—The minutes of the Proceedings of the last meeting held were taken as read and recorded after previous circulation.

35. *Chairman's Report for the year.*

Gentlemen.—I have but little to say, as our Honorary Secretary's report which you will hear to-day is very complete and covers the ground.

The attendance at meetings during the past year was very poor, and it is with the hope of infusing more life into the association that I am bringing forward a resolution at to-day's meeting to limit our meetings to two per annum and to hold these meetings alternately at Trichur and Calicut so as to suit the convenience of the members who live in Malabar.

The matter of financing the U. P. A. S. I will come up for discussion to-day, and I will merely say that if the U. P. A. S. I is worth having it must be adequately financed. I for one would like to see this done on an acreage basis throughout.

The market for rubber has been good throughout the year and the forward sales that have been effected for 1912-1913 indicate that we may expect good prices for some time to come.

The International Rubber and Allied Exposition will be held in New York towards the close of September and it is to be hoped will bring manufacturers in still closer touch with plantation rubber. It does not however seem probable that South India will be able to support this unless the opportunity is taken by the tea and coffee planters to join with the rubber growers in the movement.

I have to express my gratitude to Mr. De Roos Norman, our Honorary Secretary, for all the work he has done during the past year on behalf of the Association and to tender my resignation of the chair.

36. *Honorary Secretary's Report.*—Annual Report of the M. C. P. A. by the Honorary Secretary, March 31st 1912.

Mr. Chairman and Gentlemen—

I have to submit the Annual Report and account for the year ending March 31st 1912, the meeting this year is being held earlier than the date fixed by our book of rules. This is on account of the absence of so many members in the months of April and May on leave or otherwise that it was thought advisable to hold the meeting to-day.

I took over the Honorary Secretaryship from Mr. Gudgeon on the 6th of May with a cash balance of Rs.16-13-0 and I now have the pleasure of bringing forward a balance of Rs1,056-13-2, which includes the payment of the whole of the acreage cess for 1912 at the rate of 1½ anna per acre. Everything has been paid for with the exception of the subscription to the U. P. A. S. I., Scientific Officer's Fund and the up-keep of the Laboratory for the season 1911-12. This matter was brought up for discussion at the last meeting, but as that Meeting was so badly attended, this matter was therefore deferred, and is now brought up for discussion and decision at the present meeting. From my Circulars and letters posted to members, it will be seen that we have been called upon by the U. P. A. S. I., the parent Association, for more funds to enable them to meet their obligations, their expenditure being more than their income. We are met here to-day to discuss this question. At present we have been paying the U. P. A. S. I. a subscription of 8 pies per acre exclusive of the Sc. O's Fund and Laboratory expenses. But now the Secretary of the U.P.A.S.I. in a letter dated the 20th November No. 63/11 calls upon us to pay a sum of Rs.1,387 inclusive of subscription to the Scientific Officer's Fund and Laboratory expenses, which would work out to 2 annas per acre. In order to meet this charge, and the expenses of carrying on our association, we shall have to approach our agents and proprietors to give us sanction to double the present acreage assessment to 3 annas per acre : this, gentlemen, is a question that will have to be decided to-day and so far as I can see is the only solution that at present can be arrived at where we can help the parent body and without crippling ourselves.

Our Acreage.—This to date is 11,468, as against 8,443. 17 at this date last year, a copy of which is herein appended.

Accounts.—These have been circulated amongst the members of the Association and I shall be very pleased to answer any question that I may be asked relative to the same. The books are on the table and are open to inspection and are ready to be audited.

S. I. P. B. F.—A sum of Rs.205 was collected for this worthy and benevolent Fund and the money received, remitted to Mr. Ormerod, the Secretary of the above Fund, and his receipts have been duly posted to the contributors.

L. A. N. I. Fund.—I regret to say that this Institute has been very poorly supported, as only Rs.60 has been collected on behalf of the same. Members who have not subscribed are requested to send their donations to the Honorary Secretary, who will remit the same to Major Elwes, C. I. E., the Treasurer of the above Institute, those who have kindly contributed have received the hearty thanks of Lady Ampthill through her deputy, Major Elwes.

Members.—We have now on our Register 10 Honorary members and 30 members; total 40 members. Messrs. Nicoll, Forbes, Kirk, Hall and Parker, I regret to say, have resigned the Association.

Correspondence.—During the period under review 1,289 letters and Circulars were sent out by the association.

Meetings.—It is disappointing that meetings are so poorly attended and that few members bring up questions for discussion. One would think that there are many evils from which we suffer that could be remedied or improved upon if we were all to pull more together, and many things that we may want done could be done, if we went solid for them. But unless we occasionally meet together as a district, I do not see how things in general can be bettered.

In thanking you, gentlemen, for the honor you have done me in electing me your Honorary Secretary, I now beg to tender my resignation and to place the resignation of the Committee in your hands. I do not seek re-election.

37. *Accounts.*—Proposed from the Chair that the accounts be passed subject to audit and that the Honorary Secretary's Report be printed *verbatim.* Proposed by Mr. E. Lord and seconded by Mr. Hallilley: That Messrs. Mead and Plowden be appointed auditors.

38. Read letter from the Secretary of the U. P. A. S. I. dated 29th September 1911, *re* the question of the new official years finances brought over from the last meeting. Proposed by Mr. E. F. Barber by proxy that the M. C. P. A. subscription be at the rate of 2 annas per cultivated acre to the parent body.

The following amendment was proposed by Mr. E. Lord and seconded by Mr. W. D. Tait and carried unanimously:—That the question of increased subscription to the U.P.A.S.I. be left to our delegate at the Annual Meeting and that he be deputed to agree to a 2 annas cess rate per acre provided he is satisfied such extra subscription is necessary.

39. *Scientific Officer's Fund.*—Resolved that this matter be placed in the same category as serial No. 38.

40. *Read the Chairman's Resolution.—Re* the Association and meetings—Proposed from the Chair and carried unanimously:—

"That in view of the distance between the estates subscribing to the "Malabar Coast Planters' Association and the difficulty that members have "in attending the meetings of the Association, it be resolved to limit meet-"ings to two per annum, to be held alternately at Trichur and Calicut."

Read letters re Rubber Exposition, New York.—Resolved that owing to the general lack of support in Southern India this Association sees no prospects of Southern Indian exhibits.

To appoint a Delegate U. P. A. S. I. Meeting.—Proposed by Mr. E. Lord and seconded by Mr. Tait: That the Honorary Secretary be our delegate at the U. P. A. S. I. meeting to be held in August.

To appoint Chairman and Honorary Secretary and Committee.—The following members were elected to serve on the executive for the ensuing year. Mr. E. Lord (Chairman), Mr. H. C. Plowden, Honorary Secretary, Messrs. A. H. Mead, Campbell Hunt, and R. de Ross Norman.

44. Resolved that a vote of thanks be conveyed to the Honorary Secretary and Committee of the Trichur Club for their kindness in allowing the Association to hold their meeting in the Club.

Papers laid on the Table.—U. P. A. S. I. Circulars, account books and files, the Indian Currency Budget, the administration of the Cochin State for 1911, and sundry papers on planting politics.

A hearty vote of thanks was proposed by the Chair to the retiring Honorary Secretary and carried unanimously.

A vote of thanks to the Chair terminated the Proceedings.

(Signed) A. H. MEAD,
Chairman.

(Signed) R. de ROOS NORMAN,
Honorary Secretary.

TEA.

Ceylon Tea.

The number of tea factories in Ceylon has been given lately as 863. The building of a tea factory in Ceylon is usually a substantial iron-roofed rectangular two-storey building about 120 feet long, 35 feet wide, and 25 feet to 30 feet high, with a well-lighted and ventilated interior. Generally a glassed-in verandah runs along one or two sides. The machinery is all contained on the ground floor, and is driven by steam, oil, or water power, of about 15 h p. The upper storey is used for leaf withering purposes, and is often fitted with fans to assist the drying process.—*Commercial Intelligence.*

Indian Tea.

A PLANTER writes in *Capital* of April 4, 1912;—"To date the prospects are very hopeful. In some districts some rain is wanted; and as it is continually clouding over, there is every chance that we may have it shortly. All the garden works of the season are well in hand, and I am not aware of a single instance where any of the cold-weather work is not all put through. Tipping has commenced, and some of the China jât gardens have been going on with this work for a fortnight. Most gardens have run out of bheel soil for manuring, and now are making up the deficiency as far as possible with extra cultivation, more attention being paid to preserving all line manure and the systematic use of oil-cake and green-manuring. The drain trenching system of cultivation is now practised on most gardens, and it is now fully recognised that it would have been a much better plan in past years to have used those trench drains for covering the bheel soil used for top dressing. Whilst putting the material down, where it was most needed, it, at the same time, has a tendency to act in opposition to a surface rooting habit being contracted by the plant. Our light sandy plateau soils are not at all suited for a surface rooted plant."

"The tea plants, which, from whatever cause, have contracted a surface root action, are always bound to suffer more during a drought than those whose roots have deep ramifications. Careless planting in most cases is the primary cause of a shallow rooting habit, and the system of year after year top-dressing with which bheel soil has had a strong influence in the same direction. This is amply proved by the fact that when these trench drains have been opened for inspection, a couple of years after the bheel soil has been in them, the roots of the tea bushes have been found to be feeding on the material at the bottom. In former years the roots would undoubtedly have come to the surface for the same purpose, but the continual *kodali* cultivation effectually prevented them. Our systems change, but they change slowly, and it is mostly circumstances that force the change upon us. These slow changes are generally for the better, as they are made to meet changing conditions, seldom made on our initiative or forethought."

"Another change in the system of thinning out the useless growth which always more or less acts deterrently in the production of leaf as well as encouragingly to the hosts of pest and blights to which the tea-bush is heir in a cultivated state. A trial this season is being made to see how disbudding these useless twiggy growths by taking them outright from where they spring from the old wood. Disbudding, of course, is a well-known system practised in the case of fruit-growing. It may be argued that as leaf is the object, and fruit disbudding is not at all desirable in the case of the tea-bush. But as the disbudding of fruit trees is practised in order to keep the tree open and free to the access of light and air, and to divert the sap which would be wasted on non-productive wood into useful channels, we aim exactly at the same thing when we clean out our bushes of useless twiggy growth at the time of pruning of the tea-bush. I have only heard of two gardens giving the disbudding system a trial on a limited scale this season, but presumably it has been led up to by a series of small experiments. No garden, by all accounts, put the system in force all at once over its whole area. If a garden has not commenced to disbud from the young stage of the plant, the only other time to start is after a heavy prune. It would appear a hopeless task to start disbudding an old neglected bush. The experiment will be watched with interest, and although, by no means, a new idea, disbudding the tea-bush is quite a new departure.

Russian Tea Buying and the British Growers.

The writer of "Tea Notes" in the *Financial Times* of the 20th February, has drawn marked attention to what a great and important factor Russia is in the tea trade. He states that the chaos in China stopped purchases in Colombo and Calcutta for the Hankow factories causing a total decrease of 5½ million lbs. in the quantity bought. . . There can be no doubt that the withholding of Russian orders has had a very appreciable effect on prices. The famine in Russia and the high prices ruling for common teas have probably had a great deal to do with the Moscow merchants holding aloof. The latter reason appears a very probable one, as we learn that she has been buying more from China and Java than before. So the high prices for our common teas have not been altogether an unmixed blessing, in that it has estranged a class of buyers who took certain grades of our hands at remunerative rates. Now that these have declined in value we can only hope our Russian friends will once again be more in evidence. —*Indian Planters' Gazette*, March 16.

Increased Tea Clearances.

The duty payments of tea recently have been on a larger scale, showing an important increase upon those of last year. The total quantity entered for home consumption in February was upwards of 3¾ million lbs. more than in the corresponding period of last year, and for the first half of March exhibited an excess of nearly 2½ million lbs. over that of last year, when deliveries were delayed through duty anticipations. From the dull state of the tea trade of late it cannot be said that consumption has much increased, and the larger clearances from bond are generally attributed to the coal strike and consequent fears as to the delivery of goods. Most distributors are holding a little more stock in anticipation of any dislocation of raliway traffic. Trade in the country is generally quiet, but the reduced offerings at auction this week have imparted a steadier tone to the Market.—*Grocer.*

From the 1st instant the business of the firm of Messrs. Cameron & Co. at Quilon has been absorbed by Messrs. Harrisons and Crosfield, Ltd. Messrs. Harrisons and Crosfield have been established in Quilon since the middle of last year, and from the beginning of this year the South Indian estate agencies, comprising over 20,000 cultivated acres, have been removed from the Colombo office to the Quilon office, from which date Mr. John Mackie has been in charge. The absorption of Messrs. Cameron & Co.'s business will add considerably to the importance of the Company's Quilon branch. It includes a brick and tile and a saw mill businesses, and sundry agencies. Messrs. Harrisons and Crosfield have their own office, green tea factory and bungalow, and have now acquired business buildings, and another bungalow, situated on about twelve acres of land.

The Planters' Chronicle.

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(INCORPORATED.)

"Bulletin No. 1."

As the first of the series of Bulletins to be published in accordance with a Resolution passed at the Annual Meeting, 1911, Mr. Rudolph D. Anstead, B. A., Planting Expert and Scientific Officer to the U.P.A.S.I., has compiled a comprehensive treatise on the subject of "Bordeaux Mixture and Pink Disease of Hevea Rubber," and this is now ready to be supplied to all planters who wish to purchase it. The price (to members of Planters' Associations affiliated to the U,P.A.S.I.) will be Re.1/8 per copy (per V.P.P. to any part of India or Ceylon). To others than the above, the price will be Rs.10 per copy (per V.P.P. to any part of India or Ceylon).

Mr. Anstead has written the following preface to the Bulletin :—

"At the Annual Meeting of the United Planters' Association of Southern India held in 1911 it was suggested and agreed that some of the Papers written by the Scientific Officer and published in the *Planters' Chronicle* dealing with subjects of special interest should from time to time be collected, revised, and brought up to date, and published as Bulletins.

"Such Bulletins, of which this is the first of a Series, cannot contain much that is original, and they will often be merely a collection of articles from various sources which have been published in the *Planters' Chronicle*. In fact these Bulletins will be published for the convenience of the members of the United Planters' Association, and are designed to save them the inconvenience of searching through back numbers of the '*Planters' Chronicle* for scattered articles on any one subject, and they are not for the purpose of presenting to the Public and to Scientific Bodies new and original discoveries, which is the usual purpose of Agricultural Bulletins. The time is not yet ripe for this latter procedure. Many experiments are now in progress, and when these accumulate results the time will come when Bulletins of the more normal type can be published."

Malabar Coast Planters' Association.

Mr. D. de Roos Norman writes :—" With reference to the minutes of the proceedings of the above in your last issue of the *P. C.* re the amendment brought forward by Mr. Lord to Mr. Barber's resolution relative to the U. P. A. S. I. I beg to state that the amendment was carried through but not 'unanimously.' Kindly correct this."

Notes and Comments by the Scientific Officer.

155. *Eelworms on Tea.*—The subject of Eelworms as a pest of Tea nurseries was dealt with recently in the *Planters' Chronicle.* It appears that this pest has been giving a certain amount of trouble in Ceylon also, and the following note on the subject by the Government Entomologist appeared in the March issue of the *Tropical Agriculturist* :—" Some tea seedlings have been sent in from the Ambawella district, with the characteristic symptoms of eelworm infection. The collar and tap-root are irregularly thickened and rugose, the bark being of a corky texture, with many decaying cavities. On stripping off the diseased bark of these roots many eelworms are exposed, some of them in the encysted condition of *Heterodera*, but others of a worm-like form.

" My correspondent reports :—' In my nurseries the leaves of the small plants turn yellow, and—when such plants are pulled up—their tap-roots are found to be eaten through. No big plants suffer. This disease runs right through some of the beds.'

" In the '*Tropical Agriculturist*' of July and August, 1909, a similar attack is described, and photographs of the injured roots of tea seedlings are shown in the November number of the same volume.

" This pest, so far as tea is concerned, appears to be confined to quite young plants. As soon as the tap--roots have penetrated to the deeper layers of the soil they appear to be immune from attack. I have never seen any signs of trouble from eel-worms on older plants in the field. Though principally a pest of the nursery, it is possible that plants grown from seed at stake, in infected soil, might suffer.

" When once the pest has appeared in the nursery, it is useless to attempt to save the younger plants. The larger plants, that have already formed strong tap-roots, may be planted out with safety, after which the remaining seedlings (in the infested beds) should be pulled up and burned. The ground should then receive a heavy dressing of quick-lime and be allowed to lie fallow for some months,—the longer the better. It is said that the young worms are able to remain alive in soil devoid of vegetation for months, apparently without taking any nourishment. When fresh plants are placed in such infested soil, the worms enter the rootlets and feed upon the tender tissues. When fully grown, the females become encysted and assume a globular or pear-shaped form, and develop large numbers of eggs. The resulting young worms usually leave that plant and wander in the soil in search of fresh rootlets.

" One of the principal causes of trouble in tea nurseries is the bad habit of utilizing the same ground several consecutive years, during which time the eel-worms become more and more concentrated in the soil. No damage may have been noticeable during the first year, though it is probable that a few isolated plants may have been attacked. During the process of making up the beds for the second year, the infected soil is distributed over a wider area, with the result that a larger number of plants are attacked and thousands of young worms are liberated from them. In the third year, by a similar process, whole beds may be affected, when the resulting damage to the seedlings is at once patent.

" Thorough dessication of the soil has an inhibitive effect upon the development of the worms. The old-fashioned plan of burning the soil to be utilized in nurseries would be a still better safe-guard. Another methed of disinfecting soil has been suggested in a Bulletin issued by the United States Department of Agriculture. It is there advised that seed beds and nurseries should be sterilized before planting by means of Formaldehyde (commonly known as Formalin). The treatment is described as follows:—

"The formaldehyde method consists essentially of treating the soil with a weak solution of 1 part commercial formaldehyde. It has been found that a solution of 1 part commercial formaldehyde in 100 parts of water is effective against the root-knot nematode in shallow beds when applied at the rate of 1 to 1½ gallons (or more in the case of very absorbent soils) to every square yard of soil surface. For deep beds the quantity must be increased. Care must be taken that all parts of the soil are reached and thoroughly wetted by the solution. Upon the thoroughness with which it is done depends largely the success of the process. After the formaldehyde solution has soaked in the soil should be thoroughly stirred, so that all parts may be exposed to the disinfectant. Before setting into the soil any plants or sowing any seeds the excess of formaldehyde must be allowed to escape by evaporation or, if necessary, be washed out by flooding the bed. The former is preferable. The writer has not found the germination of seeds interfered with when 10 days are allowed to elapse between the treatment and the sowing of the seeds, especially, if the soil be allowed to become rather dry and be stirred in the meanwhile. The treatment of plants already attacked is almost impossible. Means that will destroy the nematodes are mostly injurious to the plants containing them."

156. *Availability of Phosphoric Acid in Bones, &c.*—The rate at which the Phosphoric Acid in Bone Meal becomes available depends upon the amount and the character of the soil humus and the bacterial activities occurring in it. The fineness of division of the Bone plays an important part in relation to the bacteria; the finer the particles the more intimate their contact with the bacteria and their products. The Phosphoric Acid of finely ground Bone Meal becomes much more quickly available than that of coarsely crushed Bone because the former presents a much greater surface of attack to the soil bacteria. Bone Meal may be made more effective as an available form of Phosphoric Acid by composting it with Cattle Manure, which with its vast numbers of bacteria, its organic matter undergoing decay, and its large amounts of carbon dioxide, hastens the solution of the insoluble phosphates. Similarly it becomes more rapidly available when used in conjunction with green manures. Conditions favourable for the rapid increase of bacteria and bacterial products are created in the soil by the green manure and therefore also for comparatively rapid conversion of the insoluble phosphoric acid of the Bone into available forms. The same is true of Basic Slag, the availability of which depends largely upon its fineness of division. The bacterial relations in this case are influenced by the Iron and Lime contained in the Slag as well as by the Phosphoric Acid. Owing to the conditions being very favourable for the vigorous growth of bacteria, Basic Slag gives the best results on light open soils and when used in conjunction with green manures.

RUDOLPH D. ANSTEAD,
Planting Expert.

A Colonial Office Report states that the progress of coffee growing in Uganda has been remarkable, and it is thought that in the next five years coffee will rival cotton in importance. Rubber will not show any great increase until the large areas now being planted come into bearing. Plantation rubber, however, appeared for the first time last year in the export list.

RUBBER

Rubber Planting in Burma.

It would seem surprising how little is known of Burma generally. Especially astonishing is the ignorance prevailing with regard to its immense potentialities as a future planting centre. Indeed, the little common knowledge possessed by the British public on this head is ordinarily the bitter outcome of experience gained through unprofitable gambling.

The Rubber Boom was the bane of Burma and other countries in a similar stage of development. Specious propositions were floated wholesale, rendered impossible in many cases, not because the scene of operations was necessarily unsuited to the product, but on account of the deplorable ignorance of local conditions. Mistrust followed the inevitable disappointment, and the unfortunate country was banned. In the Malaya companies, prospectus promises were not always realised, but the grand and patent success of the rubber-planting industry was too apparent to hinder the influx of capital for the support of honest endeavour.

Burma has many advantages as a rubber-growing country: the soil is excellent, labour cheap and plentiful, and diseases common to the Hevea are practically non-existent. The growth is faster than in Ceylon, and in a well cared for plantation is said to be equal to the Straits average. It has been difficult to judge, for the simple reason that the few pioneers were handicapped by lack of funds, which of necessity resulted in very indifferent cultivation. It is worthy of remark that the climatic conditions of Burma induce a very rapid renewal of bark, a most important advantage from an investor's point of view; and again, the physical properties of Burma-grown Pará are recognised by experts to be second to none. Land is easy to acquire, and there are thousands of acres waiting to be opened up by anyone enterprising enough.—*The Rubber World.*

Peculiarities of Latex.

Latex is a peculiar mixture and its origin is still a mystery. It occurs in plants growing along the lanes and in the meadows of this island, especially the spurges; its presence is recorded in plants inhabiting desert areas and in the sub-tropical and tropical zones of both hemispheres. The majority of living plants thrive vigorously without it and many botanists have come to regard it as a waste product, or as a mixture having relatively unimportant functions to fulfil. Though laticiferous plants have probably always formed a part of vegetation and though they have been known as the source of caoutchouc or India-rubber, for very many years, nobody can tell us where latex really comes from or what changes its reproduction entails. True we know that in various plants it is contained in (1) specialised groups of cells as in gutta-percha yielding species, (2) long open tubes as in Castilloa and Rambong trees, or in the irregularly connected partly broken down tubes of Hevea and Manihot. In some plants it makes its appearance in the spring buds and soon disappears; fortunately for the plantation industry it remains for all time in the living tissues of Hevea and other trees. Even after the death of the trees, the remaining stumps may possess latex. We have extracted it from a Hevea stump, many years old at Heneratgoda, Ceylon; Ridley has also recorded its presence in old and apparently dead stumps at Singapore. When it occurs in such tissues it is probable that the cortical or bark cells of the stump are still alive, though the tree may have been felled for several years; the root system does not die immediately the trunk of the tree is chopped down.

WEIGHT OF LATEX AND BARK COMPARED.

If our attention is confined to latex in the living plant, a very peculiar condition will be noticed. In the ordinary method of quarter-section tapping a yield of many pounds of dry rubber may be obtained in a year. Some old trees in Ceylon and Malaya have in one year only, given 5, 12, 25, and even 80 lb. of dry rubber by methods of tapping which have not killed the trees; in fact, the yield has been repeated in subsequent years. This large quantity of rubber is secured by incising or excising the bark from the base to a height of five or ten feet. It is at ouce apparent that the weight of latex is quite three times that of the dry rubber, for it contains a large quantity of water and certain proportions of resins, proteins, mineral matter and other substances.

It is also a fact that the weight of latex obtained from a specified section of bark is greater than that of the bark actually tapped. Furthermore, it is conceivable that the total weight of latex obtainable from tapping the whole of the bark of a tree for a long period of time is greater than the total weight of the bark on the tree at the commencement of tapping operations. Where, then, does the latex come from?

ORIGIN OF LATEX IN PLANTS.

It is recognised that whenever an incision is made in the bark of rubber trees the latex flows from adjacent tubes to the point of issue. Generally an incision drains a larger area of bark in Rambong and Castilloa trees than in the case of Hevea and Ceará trees. In Hevea the latex seems to be fairly well exhausted in all directions to about the length of a cigarette; after an interval of one or two days the same area is again recharged with latex, often in increased quantity until the effect of wound response has died out, fresh incisions being followed with copious flows. That this phenomenon is repeated every day in the year on the same tree is really little less than astounding. The repeated issues of latex containing profitable quantities of rubber must be derived not merely from areas originally in existence; they must be obtained as the result of freshly-produced latex in the ordinary processes of the plant's growth. Latex contains very little material of actual food value to the plant, but it is fairly certain that it is formed from carbohydrate substances (sugars, starch, etc.,) which occur throughout the plant and are normally used in the growth of the various tissues.

WHY LATEX SHOULD BE FORMED.

It may reasonably be asked, if latex is really a waste product of no vital importance to the plant, why it should be so produced at the expense of reserve food materials such as starch and sugar. Here lies the mystery about which plant physiologists can tell us so little. We recently had an opportunity of putting this question to one of this country's noted physiologists, who contended that the re-formation of latex might be the result of the plant's attempt to maintain an equilbrium. It is known that many animals may, when they lose part of an unessential organ, reproduce the missing part at the expense of common energy. This may seem, at first blush, incompatible with the view that an organ of no use will gradually disappear. But the two phenomena are not on all fours, and for the present we must accept the explanation given to us. A plant having a laticiferous system will always attempt to reproduce it if a part is removed, even though it thus perpetuates a structure useless to itself and performs this work at the expense of food supplies which might have been used for some vital purpose. And it is fortunate for mere man that nature works in this mysterious and apparently foolish way.—*India-Rubber Journal.*

On the Ivory Coast.

Quoting from an official report recentiy issued on rubber cultivation in the Ivory Coast, the "Quinzaine Coloniale" (Paris) of 25th February states that the production of wild rubber in that colony is, generally speaking, carried on satisfactorily, except for a certain amount of fraud and adulteration. Large tracts of *funtumia* rubber trees, which have as yet scarcely been touched, still exist in the western half of the colony. In the east the forests have been more depleted, but the deficiency thereby caused can be made up by replanting trees. In ordinary circumstances, therefore, the cultivation of wild rubber would augur well for the future of the colony, if it were not for the great strides which are being made in the cultivation of plantation rubber, which may have a detrimental effect on the wild rubber industry. Experience tends to show that a large part of the Ivory Coast is suitabie for the extensive cultivation of rubber trees. The *Hevea* and *funtumia* are easy to grow and give good results. The great difficulty which is usually encountered in procuring labour in this part of Africa is also disappearing with the opening up of new routes to the Sudan.

Rubber and the F. M. S. Census.

More than a million persons are resident in the Federated Malay States, of whom 3.284 are Europeans. Ten years since the European population was only 1,459. The effect of the extension of the rubber-planting industry on the European male population of the F. M. S. is shown in the Census report. In 1901, only 108 Europeans returned themselves as engaged in agriculture, whereas, in 1911, the number so engaged amounted to 882, or eight times as many as in 1901. Mr. A. M. Pountney says: "It is somewhat regrettable to notice that a few of the more light-hearted Europeans employed on the estates considered the filling in of details as to their own religious professions and civil condition an opportunity for a display of some form of wit."—*Malay Mail.*, March 14.

Rubber Taxation in the F. M. S.

At the Golden Hope meeting on Tuesday, Mr. A. Lampard put the case against the taxation of rubber in the F. M. S. in such concise and forcible terms that we reproduce his remarks verbatim. "There is," he said "only this one thing which we, in common, I believe, with everyone responsible for the working of the rubber estates in the F. M. S., have to complain about. That is, we consider that the taxation imposed by the Government there is unnecessarily high. The F. M. S. has a surplus of over £5,000.000, but it still insists upon extracting from the rubber industry the pernicious export tax of 2½ per cent., which is not in force in Ceylon, in Southern India, or in any of the Dutch Colonies . . . The expenditure of that money will, as a matter of fact, create a further competition for labour which will be detrimental to us who are working in these particular States. It is a question mainly for shareholders, and it is one of general interest to the rubber industry as a whole, or, at all events, to all of those companies working in the F. M. S. The British capital invested there must be fully £30,000,000. That capital is being taxed without any representation. We have no voice whatever in the taxes that are being raised, and shareholders should realise that their capital is being subjected to taxation which is not for their benefit. If on realising this the shareholders in this country do not make a protest, then I think they deserve to be taxed to the fullest extent. They deserve no sympathy. But I believe that when this subject is thoroughly realised, there will be a general protest in this country by all people who have got their money invested in the F. M. S. The natural zone of the F. M. S. should make this part of the world possibly the most favourable part for the successful cultivation of rubber, but the taxes which are being imposed upon us make it a less favourable place than Ceylon, or Southern India, or the Dutch Indies."

Why should British enterprise be handicapped in a British colony more than in the neighbouring Dutch Colonies? How long will shareholders sit down quietly under infliction?—*Rubber World*, April 4, 1912.

SELECTED CUTTINGS.

Labour in Java.

In a recent issue of the *India-Rubber Journal*, we dwelt upon the subject of Hevea in Java and the general prospects for investors in that island. On the question of labour supplies an interesting letter appears in *The Java Times*, from which we extract the following:—

"The Government says that the labourer is a free agent, and that we may employ him if we get him. Well, we *can* get him, by paying 100 fr. a head more or less and when we have got him, he does two or three days' work, collects his pay, and goes away to another estate (for crimping is a well-understood art in this country), or perhaps he returns to his kampong. In any case, do you think the authorities will insist on his keeping his agreement! Not at all. Will they tell him that while he can please himself whether he works for us or not, if he *does* agree to work, he *must* fulfil his engagement? Certainly not. He is free, free to be idle, free to take what he can get out of us, and to rob us (for it is robbery) of the labour for which we have paid.

"And then note the inconsistency of the Government. If a planter in Sumatra wants coolies, he can get them, on contract, from Java, and if the coolie breaks his contract, he may be punished by law. Why it should be right to make the coolie keep his engagement in Sumatra and wrong in Java, only a Dutch lawyer oould tell you.

"I say nothing here of the extraordinary policy of a Government which permits thousands of Javanese to be enlisted (under contracts which are rigidly enforced) for service in Singapore and the F. M. S., while refusing any facility to the planters whose money and brains are being expended on the development of this country.

"I am writing this letter, not so much in the hope that it will induce the Government to reconsider the position—that I fear it will never do on its own initiative—but in order to call the attention of capitalists in London and elsewhere to the risks they are running in the investment of capital in Java, where there is certainly plenty of labour, but under conditions which make it impossible for any industry (except, perhaps, rubber), to be carried on at a margin of profit, and the rubber people will find, in the course of two or three years, that their labour bill is becoming two or three times as heavy as it is now, and that even then they will not be able to keep it, for they will pay perhaps 100 fr. to 150 fr. to get a coolie on to the estate, and as soon as he has earned a couple of guilders he will lie off till he has spent it.

"The fact is that the whole condition of labour legislation in this country is antiquated, and needs bringing up-to-date. Let the Government . . . , . insist, if it likes, on a minimum wage, on decent dwellings, on hospital, medical, sanitary arrangements, on provision being made for the comfort of the coolie on a scale, somewhat higher than he is accustomed to: let it do all this and the planter will agree; but to continue as at present means trouble all round, and, if I am not mistaken, trouble of a very serious nature, which may the gods avert!"

We cannot help agreeing with the author of the above regarding the necessity to arrange for the fulfilment of contracts in Java as in the sister-colony Sumatra. It is better for the labourer, for the investor, and for the Government and the whole island. What is possible in Sumatra is, by the assistance of Government labour inspectors, equally possible in Java. —*India-Rubber Journal.*

Vanilla Preparation in the Seychelles.

Mr. Consul Alexander W. Weddell, Zanzibar, reports:—

The proprietor of the Cascade Estate, Seychelles Islands, thus describes the method of preparing vanilla beans on that plantation.

A successful result depends on the pods being picked at the right stage of maturity more than on anything else—that is, when they are ripe and just before they begin to split. An unripe pod will never prepare well and is always inclined to become mouldy; split or over-ripe pods have lost much of their value.

A pod in condition to be picked has lost to a great extent its shiny green colour, has become duller, with an almost silvery appearance. The longitudinal lines along which it will eventually split, if felt, are distinctly marked. The tip is light in colour or even yellowish, and comes away fairly evenly from the stalk when broken off. Pods in a bunch seldom ripen simultaneously, so they must be carefully watched.

When brought in the pods are sorted into five qualities: (1) Over 6 inches long; (2) over 4 inches long; (3) under 4 inches long; (4) split; (5) unripe, broken, etc.

A caldron of water is heated to 87° C. (188'6° F.); the pods are placed in an openwork basket and dipped for 10 seconds, withdrawn, and allowed to drain for about 5 seconds; dipped again for 10 seconds, withdrawn, and drained as before; dipped again for about five seconds, or until their colour has changed to a dark green. Large pods require a longer third dipping than small ones. After being scalded the pods are wrapped in woollen blankets and left in a warm, dry place for 12 hours, when they have taken on a blackish hue.

They are then placed in openwork trays in a hot room, on one thickness of blanket, and covered by another; temperature of hot room 90° to 90° F., not over. In about 10 days the largest pods will have become wrinkled, the smaller ones before that. When in this stage they can be removed to a cool drying room, where they are placed on trays, uncovered, heaped on each other to a depth of 3 inches, and turned about every day. The more slowly vanilla is dried the better. In about 10 days for small pods dry ones may be looked for; these must be taken out and stored in a dry place in well-closed wooden boxes. Examine thoroughly from time to time, and take out all that show signs of mould; this appears mostly at the stalk end. A dry pod should have a silky feeling, the wrinkles must be soft, there must be no hard centres, and it should be possible to tie the pod in a loose knot without its breaking. Absolute cleanliness must be observed all through the preparation, and those who handle vanilla must wash their hands before touching it.

When sufficiently dried the pods should be put into a vessel containing water at a temperature of about 80° to 90° F., and stirred about with the hands for five minutes, then taken out and placed in trays or on a blanket in the sun, where they soon dry. The pods must now be measured (quarter-inch differences are sufficient) in the middle only. Tin boxes are used in Seychelles, 13 inches long, 9 inches broad and 6 inches deep, a lining of parchment paper being placed in each. The vanilla must be packed fairly loosely and the lid secured by solder.

The process is difficult to describe. If vanilla is to be produced in any large quantity, a man should be sent to the Seychelles to learn it. The season of preparation is from May to Septemher.—*Spice Mill.*

REPORTS OF COMPANIES.

The Periyar Rubber Company, Limited.

80 PER CENT. FOR THE YEAR.

The seventh ordinary general meeting of shareholders of the Periyar Rubber Company, Limited, was held at 3 p. m. on April 4th at the offices of Messrs. Cumberbatch & Company, Colombo, Mr. F. L. Clements presided, and there were also present: Messrs. Gordon Pyper and David Scott (directors), R. F. Darby, A. R. Morrell, and R. Whittow, representing the Agents and Secretaries.

THE CHAIRMAN'S SPEECH.

The Chairman, in moving the adoption of the report, said:—Since the publication of the report and accounts several shareholders have written requesting that more information be given at the meeting regarding the probable results of the bad tapping mentioned in Mr. Tisdall's report. This I will readily give, but I must first explain that the directors read the report with surprise and consternation. It was arranged that Messrs. Barber and Pascoe should pay three visits during the year and that Mr. Tisdall should be asked to make the fourth, but when it was found that Mr. Tisdall could not visit before February, 1912, Messrs. Barber and Pascoe were asked to pay an extra visit in December, 1911. The estate was managed by Mr. Kirk assisted by Mr. Horsfall (who has been nearly four years on Periyar) and Mr. Agar. Messrs. Barber and Pascoe reported in July, 1911, that under the present rate of excision renewed bark would have to be tapped at 3 to 3½ years, that the new tappers were not doing such good work as the old, but seemed to be improving, but that more bark was being excised than was necessary and in places the cuts were too deep. In September they reported they thought there was some improvement in the class of work the tappers were doing. In December they reported that daily tapping was going on in all the young fields and in a large proportion of the old, and was only not being done where the trees would not stand it. That there was an improvement in the tapping, not so many deep wounds being in evidence. On the Sarupara division, too much bark was being used up, and every effort should be made to get more cuts to the inch. The Sarupara division consists of 146 acres planted in 1904, 43 acres planted in 1905, and 143 acres planted in 1906. Mr. Tisdall visited in February, 1912, and reported the tapping as generally inferior. On Neeramangalam-division (208 acres) it was not so bad, on the Palamattam division (324 acres) it was medium, but on the Sarupara division the amount of bark used up was amazing and the wounds made very detrimental to bark renewal and future crops for some time. He recommended a quarter of the renewed bark to be operated upon, and that only where it was of sufficient thickness. The knives in use were worn out and only fit for the dust heap. Allowing for the difficulties of a constantly changing labour force it is evident that the superintendent has failed to excise sufficient supervision over the tappers and has not personally examined the knives. He has, however, resigned and further reflection on his management can serve no good purpose. If it be remembered that Periyar is a long narrow strip of land about ten miles in length the difficulty of thorough supervision may be realised. Situated, too, as it is in Travancore, and completely isolated from other estates, makes it more arduous for the Directors to keep in touch with and exercise that complete control over the superintendent as regards the details of cultivation and management, and a good deal of responsibility must rest with the superintendent in charge. Endeavours are being made to get a sufficient number of coolies to carry out the tapping, leaving the collection of latex and scrap to the Malayalams. Where the renewed bark is too thin the trees will have to be rested. This will, of course, reduce the normally expected yield. and as the closely planted fields have to be thinned out a further reduction in yield on this score may be expected for about a year. Mr. Tisdall estimates that only 15 per cent. of new trees in the younger clearings will come into tapping during the year. Turning to the accounts, these disclose a very satisfactory financial position, and the capital, barely Rs.530 per acre, is bound to earn good dividends. In the working account, there is an item, irrecoverable debt on estate written off Rs.1,036'93, which requires explanation. Rs.764'18 represent old advances written off, and Rs.272'75 represent the cost of rubber seed sent at the request of Mr. Anstead, the Government Expert, to Messrs. Pierce, Leslie & Co. and Messrs. Stanes & Co., to be crushed and turned into poonac after expressing the oil. These firms undertook to get the seed crushed and the poonac analysed free of charge, and Messrs. Stanes & Co. sent the poonac to the estate. They never ordered the seed and should not have been charged with the cost of the same.

A DISCUSSION.

Mr. Darby.—I notice that Mr. Tisdall made a new estimate. Was there not an old estimate?

The Chairman.—The old estimate was Mr. Kirk's and was 180.000, which was reduced by Messrs. Barber and Pascoe to 160,000; but Mr. Tisdall said that in view of the necessity of resting these trees and nursing the bark, he did not see how they could get more than 125,000. I think Mr. Kirk based his estimate on what the trees had given—he expected to get the same amount from the trees as before.

Mr. Darby.—As regards the thinning out, will these trees be tapped to death?

The Chairman.—There is no such thing as tapping a tree to death. The tree refuses to yield. We have experimented on Periyar by pollarding and trying to tap the pollarded trees to death. As a matter of fact, the pollarded trees yield very little until they have grown a good head, and when the head or crown gets full we have unwelcome shade, and all that time they are drawing upon the soil to support them. But the trees that are left fail to get the benefit that they should do. It is better to take out the alternate trees entirely, root and all, as within six months the remaining trees would be giving as much, within a fraction, as the pollarded and unpollarded trees together.

Mr. Darby.—Of these 1906 trees, are they all tappable?

The Chairman.—No. Sir. I think you may allow a good extra year for South India as compared with the best parts of Ceylon or the Straits.

Mr. Darby.—Were any of these 1906 trees tapped last year?

The Chairman.—Yes, a few in the clearings. They are tapped when they reach 18 inches 3 feet from the ground.

Mr. Darby.—Then that should give a better return?

The Chairman.—But Mr. Tisdall estimates that only 15 per cent. will come into bearing this year.

Mr. Darby.—Of course, Mr. Tisdall made his visit at a rather bad time of the year. It was a rather difficult time of the year to judge.

THE DIRECTORS' REPORT,

which read as follows, was adopted :—

Directors.—Messrs. F. L. Clements, Gordon Pyper, and David Scott.

ACREAGE.

	A.	R.	P.
Rubber planted in 1902...	238	2	23
do. do. 1903...	6	2	04
do. do. 1904...	208	3	35
do. do. 1905...	61	1	22
do. do. 1906...	352	0	35
do. do. 1909...	20	0	00
Total under rubber	887	2	39
Streams and scrub	14	1	07
Buildings and cart road...	2	0	08
Total ...	904	0	14

The directors have pleasure in presenting their report for the year ending 31st December, 1911, together with a duly-audited statement of the accounts. The crop for the year amounted to 115,030 lbs. of rubber as compared within the estimate of 150,000 lbs. and an actual crop of 66,041 lbs. 1910. It cost Re.1'04 per lb. to produce and realised Rs.4'56 per lb. Further expenditure on immature rubber, buildings, furniture, machinery, and telephones amounting to Rs.14,760'60 was incurred. The net profit for 1911, after providing for directors' fees, agents and secretaries' remuneration, and including Rs.5,158'62 balance forward from 1910, amounts to Rs.409,572'47. Out of this three interim dividends of 15 per cent. each have already been paid, absorbing Rs. 211,500, leaving a balance at disposal of Rs.198,072'47. The directors recommend the following distribution :—

	Rs.	cts.
A final dividend of 35 per cent. (making 80 per cent. for the year)	164.500	00
To be placed to extensions accounts	20,279	99
To be set aside for depreciation on buildings, &c. ...	8,109	75
Balance to be carried forward	5,182	73

The new estimate fixed by Mr. Tisdall who visited the property on February 25th and 26th, 1912, is 125,000 lbs. rubber costing, say, Re.1 per lb. to produce. This is a disappointment but the reason given is the over-excision of bark on the tapped trees.

Weeding, he writes, shows great improvement, and he does not anticipate much further trouble, should the seed in the ground germinate, if monthly weeding is adhered to.

Manuring.—422 acres were manured with an application of 5 lbs. per tree, but he considers the work has not been carried out in the most efficient manner, and he recommends a mixture containing more potash for future applications with an increase of 2 lbs. per tree and deeper forking.

Thinning out.—About 30 per cent. of the trees in the oldest clearing are being cut out, and a continuation of this policy is recommended in all fields planted 20 feet by 10 feet apart.

Tapping.—This work has been very indifferently performed in the Sarupara Division and will confine immediate future operations to a limited surface area until the renewed bark is thicker. This is to a large extent the result of only having non-resident labourers. The coolies work for a short time and then return to their villages, sending others to replace them. Mr.

Kirk has resigned, and Mr. J. Martin has been appointed manager. A small extension to the factory is in course of construction. As intimated to the shareholders by circular of 10th May, 1910, a forward sale of half of 1912 crop has been made at Rs.7 per lb., deliveries to be made from half of each invoice received in Colombo, the proportion of the lower grades to be limited, to 30 per cent. of the total quantity delivered. Deliveries under this contract are now proceeding. Mr. Hahn resigned his seat on the Board, and Mr. Gordon Pyper was appointed in his place. Mr. Moir also withdrew when leaving the island, and Mr. Scott was appointed. The retiring director now is Mr. Clements, who, being eligible, offers himself for re-election. The appointment of an auditor is in the hands of the shareholders.

DIVIDEND, &c.

A final dividend of 35 per cent., making 80 per cent. for the year, was declared.

Mr. F. L. Clements was re-elected a director; and

Mr. O. T. MacDermott was re-appointed auditor.

GROWING TEA IN RUSSIA.

Mr. Vice Consul F. W. Cauldwell, Batum, reports, according to the *Spice Mill*;—

"The Imperial Russian Domains has an estate at Chakva, near Batum, where successful experiments are being carried on in the cultivation of tea, oranges, and other fruits, and bamboo. So far, no official reports on the results accomplished have been made public, but an exhaustive report is in preparation for an industrial exhibition to be held at St. Petersburg during 1912 and where the resources of the Caucasus will be exploited.

Tea raising began on the estate in 1890. The most promising ground was cleared and the work put under the direction of expert tea growers. Members of the Imperial Domains staff were sent to China, Japan, India and Ceylon to acquire practical knowledge of tea raising. Experienced growers were also brought out from China, and one of these still remains as Manager of the tea plantations.

Tea growing has now passed beyond the experimental stage. The annual crop averages about 200,000 pounds. For 1911 the yield will be about 20 per cent. below the average, owing to the severe winter of 1910-11. Some 1,200 acres are devoted to tea. The fields are partly on the plains and partly on the low hills, which in some cases have been terraced as a protection against erosion. Dnring the early experimental stages about 3,000 tea bushes were planted to the acre. This number has been increased until as many as 4,400 bushes are now crowded into the acre. The tea plantations are being extended at the rate of about 135 acres per annum.

The leaf is picked four times during the season. The first picking yields the superior quality, although the second is more abundant. The leaf is cured in a modern factory where every care is taken to obtain cleanliness. The cleaning, curling and packing are all done by machinery, which is mostly of English manufacture. The sanitary conditions are excellent.

The Chakva tea resembles somewhat in taste the teas of Ceylon and India, although it cannot be said as yet to have reached the excellence of the best of these. The Russian tea is sold principally in Poland and Central Asia. Shipments of about 1,000 pounds have been sent to America on one or two occasions, but no regular demand has followed."

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(INCORPORATED.)

International Institute of Agriculture.

In a letter dated Simlā, the 22nd April, 1912, the Under-Secretary to the Government of India, Department of Revenue and Agriculture, writes :—

" The International Institute of Agriculture at Rome publishes English Editions of the following Bulletins, *viz* :—(1) a monthly Bulletin of Economic and Social Intelligence and (2) a Bulletin of Agricultural Information. The official language of the Institute is French, and it was decided at the General Assembly of 1911 not to continue these English editions at the expense of the general fund, and those States which desired the English editions were asked to subscribe for a certain number of copies.

" The Government of India are of opinion that these Bulletins may be of great use in India and have agreed to subscribe for 100 copies for a short period. In order to make these publications known I am to inform you that a copy of the issues of each Bulletin will be sent to you, free of charge, for three months. Any issues required after that period may be obtained on payment from this Department or direct from the International Institute of Agriculture at Rome. The subscription for each Bulletin is 18 francs per annum."

When the promised Bulletins come to hand they will be referred to in this paper. Should any planter desire to subscribe he can communicate with the Government of India or the International Institute of Agriculture, either direct or through the Secretary, U. P. A. S. I.

Coffea Stenophylla.

Quite unexpectedly, a parcel of 1,000 seeds has been received from Home. If any planters would like to try small lots they are requested to communicate promptly with the Secretary. The price is Rs.3-2 per hundred seeds, per V.P.P.

Coffea Congensis VAR. Chaloti.

When sending the *C. stenophylla* forward the suppliers wrote:— " Seeds of *Coffea congensis* var. *Chaloti* will follow as soon as available," but, in view of the excessive delay in delivery the order on hand with these suppliers was cancelled, by mail, in March last; and by this time they will, no doubt, have acted upon these instructions. It is not very far short of eighteen months since the original order was sent to Europe. Planters who ordered this seed are requested to note what has been done in the matter.

DISTRICT PLANTERS' ASSOCIATIONS.

Mundakayam Rubber Planters' Association.

Minutes of General Quarterly Meeting held at Kutikkul Bungalow at 10 a.m. on Saturday, 6th April, 1912.

PRESENT.—Messrs. J. R. Vincent (Chairman), F. A. W. Meumann, F. H. Hall, C. B. Hall, E. E. Eyre, H. J. Byrne, W. P. Rogers, R. A. Fraser, J. Wedderspoon, F. Simmons, E. R. Gudgeon, C. M. Hunnybun, E. Vincent, and A. C. Vincent (Honorary Secretary).

1. The minutes of last meeting were taken as read.

2. *New York Exposition.*—Read communications from the Secretary of the U. P. A. S. I. and Mr. J. A. Richardson. Proposed by Mr. Eyre, seconded by Mr. F. Hall, and carried unanimously: "That the Association do not join with the U. P. A. S. I. in this matter but that a separate exhibit be sent through Messrs. Darragh, Smail & Co. who have a branch in New York, and that these gentlemen be aked to make the necessary arrangements as to space, &c., each Estate to pay its own separate expenses, which could be deducted from the sale proceeds of produce." The Chairman stated that he would be pleased to receive exhibits, so that they could be sent to Messrs. Darragh, Smail & Co. in one consignment.

3. *U. P. A. S. I. Exhibition.*—The Association agreed as to the desirability of the exhibition being held, it being left to individual members to send exhibits.

4. *Freight on Rubber to England.*—The Chairman gave figures as to the cost of freight from various ports, and it was resolved that the Honorary Secretary be instructed to apply to all shipping firms asking for a reduction in rates.

5. *Detention of Account Books in Court.*—Proposed by Mr. F. A. W. Meumann, seconded by Mr. Hall, and resolved:—"That the authorities be requested to allow sworn copies of ledger accounts to be deposited in court, as great inconvenience has been caused by the detention of ledgers for as long as six months at a time."

Correspondence—Read letter from Messrs. Mel & Co. Resolved to give unanimous support to their application for wholesale license for liquors.

Read letter from Mr. Atkins resigning membership of Committee. Proposed by the Chairman, seconded by Mr. F. Hall, and resolved unanimously:—"That Mr. Atkins be requested to withdraw his resignation."

Kadamankolam-Kuppakayam and Kutikul-Poonyar Roads.—Read letters from Government stating that they could give no grant for the maintenance of the former road, and that they could not see the utility of constructing the latter. The Honorary Secretary was instructed to inform Government that the Association greatly regrets Government cannot construct and maintain the roads in question.

Read letters from Mr. Ashton Hamond, Mr. Harley and Mr. Strachan with reference to the arrest of Mr. Hamond by the Magistrate at Ponkunam. Proposed by Mr. F. A. W. Meumann, seconded by Mr. F. Hall, and resolved unanimously:—"That the Association give their support to the complaints of Messrs. Hamond and Harley.

Date and Place of next Meeting.—Mr. E. R. Gudgeon kindly offered his bungalow at Aneikolam for the next meeting of the Association, to be held on the first Saturday in July.

(Signed) J. R. VINCENT, *Chairman.*
(„) A. C. VINCENT, *Hon. Secretary.*

Bababudin Planters' Association.

A Quarterly General Meeting was held at Santaveri on April 25th.

PRESENT.—Messrs. Denne (President), Dennis, Boyd, Kerr, Oliver, Watson. and, Kirwan (Hon. Secretary). By Proxies: Messrs. Allardice, Meppen and Raikes.

The Minutes of the preceding Meeting were taken as read.

Unloading Charges on M. & S. M. Ry.—The reply of the Deputy Traffic Manager was read explaining that the rule in force was that a charge of 3 pies per maund should be levied by the Railway for unloading. The Honorary Secretary was instructed to write to the Traffic Manager, M. & S. M. Ry., and point out that under the rules in force Consignee is obliged to unload his goods within 24 hours. That it is seldom possible to get carts to the station from distances of 20 and 30 miles within the prescribed period at the notice given. Consequently these unloading charges are a severe tax on getting manure by train, as cartmen are accustomed to unload the wagons as a part of the cart hire. Members of this Association have seen the manure left lying about on the platform at Birur, no attempt being made to cover or protect it.

Santaveri Sunday Dispensary.—The reply of the P. M. O., Mysore, was read. The Honorary Secretary was instructed to write to the Deputy Commissioner on the subject again, asking what assistance the District Fund Board would give, as no reply had been received to his letter of February, 2nd.

Birur Telegraph Office.—Correspondence on the subject was read.

Council of Mysore Planters' Associations.—The Honorary Secretary reported that the Council was now duly formed and the Minutes of the Meeting of the Council of March 17th were laid on the table. The Rules as drafted at that Meeting were read and agreed to. The Meeting decided to leave the working of all matters in connection with the Mysore Scientific Assistant in the hands of the Council. The proposed re-adjustment of subscriptions to the Mysore Scientific Assistant and U.P.A., as suggested by the South Mysore P.A., were left in the hands of the Associations' Members of the C. of P. A's, to be settled at the next Council Meeting.

Standardisation of Rates and Contracts.—Mr. Kirwan's proposal to attempt some measure of co-operation in the matter of rates and contracts, etc., having received more discussion than support, was dropped.

Mysore Scientific Assistant.—The proposal to hold a joint meeting of the three Associations in Chikmagalur on May 25th to meet Mr. Frattini, and that he should then make a tour of the Bababudins, and proceed thence to Koppa and Sullibile and remain there for the monsoon to study Black Rot, was approved of.

Labour Rates.—Proposed by Mr. Allardice and seconded by Mr. Kirwan: "That this Association is strongly opposed to raising the rates for labour or paying any bonus to coolies working a fixed number of days per month."—Carried unanimously.

Proposed by Mr. A. B. Boyd and seconded by Mr. H. Kerr: "That this Association considers that no matter of such importance as a rise in the rates for Labour should be brought into force without first consulting the C. of P. A.'s."—Carried unanimously.

District Fund Board.—Proposed by Mr. G. R. Oliver and seconded by Mr. S. H. Dennis: "That it is desirable that this Association should be represented on the Kadur District Fund Board, and that the Hon. Secretary be instructed to apply to the Deputy Commissioner accordingly."—Carried unanimously.

(Signed) NOEL G. B. KIRWAN, *Hon. Secretary.*

Nilgiri Planters' Association.

At a General Meeting of the Nilgiri Planters' Association held on Tuesday, the 16th April, the following members were present:—Messrs. E. F. Barber, (in the chair); J. S. Nicolls, (Honorary Secretary), C. H. Brock, P. M. Sathasiva Mudaliar, J. Bauer, C. Gray, G. Oakes, H. D. Wilbraham, A. S. Dandison, J. A. Kenna, S. Bayley, A. K. Downing, Aird, Church, L. L. Porter, and J. Harding Pascoe. Mr. E. F. Barber was voted to the chair. Present by proxy—Messrs. W. Rhodes James, A. R. Pigott and W. Deane. Visitor, Mr. Abbott. Chairman, U. P. A. S. I.

1. The Proceedings of Last Meeting were Confirmed.

2. Scientific Meetings.—Correspondence recorded.—It was pointed out that no interest was shown in these meetings, and the question of future sectional meetings was dropped.

3. U. P. A. S. I. Finance.—In this connection the meeting passed the following resolution:—Proposed by the Chair "That the two annas assessment to the U. P. A. S. I. be paid by the N. P. A., subject to confirmation at the next meeting."—Carried.

In this connection Mr. Barber said that he had the opportunity of finding out that many were against the 8 annas cess it was proposed to levy for the extra Scientific Officer Assistant Fund and also that the introduction of this fund would result in the loss of a large acreage being represented on the Association.

Mr. Wilbraham said that, speaking as a Coffee Planter, he did not claim that the Scientific Officer had done any good. Green bug was their chief enemy and any suggestions he had made in this connection, such for instance as the Pest Act, were impracticable. As a Tea Planter he would admit that the Scientific Officer had done considerable good.

4. N. P. A. Subscription.—Mr. Abbott, on being asked to enlighten members as the subscription paid in the Wynaad, said that his Association paid on an acreage basis at two annas to the U. P. A. S. I., which covered the Scientific Officer Fund. For the up-keep of the Association a personal subscription was paid, which covered the expenses of the Secretary and Delegates' trip to Bangalore. This was sanctioned for the present year, pending the whole question of the U. P. A. S. I. finance being settled at the next meeting. He said members would have one vote for the personal subscription of Rs.12 subscribed and one vote for every twelve rupees subscribed on the acreage basis.

Mr. Barber thought the system in Wynaad a good one and said that the main question was to see that the efforts of small holders were not swamped in the matter of votes, especially if large companies came into the District.

Mr. Kenna wished to know when the new subscription would come into force, and was informed that it was proposed to introduce it from the 1st of January 1913. He then asked what would happen to those who had guaranteed the higher subscription for five years and had not paid it. The sense of the meeting was that they should be called upon to pay up to date. Finally, the following resolution was proposed by Mr. Brock and carried unanimously:—"That each member shall subscribe Rs.12 annually as a personal subscription, for which he will be entitled to one vote and that for the first Rs.25 or part thereof subscribed on the acreage basis, he shall be entitled to one vote, from 26 to 50 or part thereof two votes, from 51 to 75 or part thereof three votes; from 76 to 100 or part thereof four votes and one vote for every 50 or part thereof over 100."

In this connection it was further proposed by S. Bayley and seconded by Mr. J. S. Nicolls: "That the resolution passed at the meeting of the 25th

March in favour of an acreage assessment of 8 annas per acre under cultivation be rescinded."

5. RULES OF THE ASSOCIATION.—Mr. Barber pointed out that this change would affect the rules of the Association which were now practically obsolete, and proposed that the rules of the Association should be formally brought up at the next meeting. After some discussion it was proposed by Mr. Dandison, seconded by Mr. Sathasiva Mudaliar, and carried:—"That Messrs. Bayley, Brock and Downing form a Committee to revise the rules of the Association."

6. LABOUR CIRCULAR.—Correspondence recorded—The Honorary Secretary was requested to write and point out to the Secretary of the U. P. S. I. that a form of circular had been approved of.

7. LABOUR CONTRACTS.—Certain correspondence to the effect that the Tahsildar would not take cognizance of labour agreements which were not printed on one side in English and one side in the Vernacular was read and recorded.

8. EXPERIMENTAL PLOT.—In this connection it was thought that as this Association subscribed Rs.100 towards the experimental plot on the Nilgiris, members should take some interest in the matter. Mr. Charles Grey said that he understood thut the plot was being started with hybrids from Mysore, of which no one knew the parentage. He said that if the laying out from the start was not done thoroughly, it would be a waste of money. Their great enemy was green bug, and it was necessary that the plot should be started with bug-resisting or bug-proof trees. Members then pointed out that the hybrid that was being brought up, they understood, was of a class of which Mr. Hamilton had a record. After further discussion it was proposed by Mr. Oakes, seconded by Mr. Nicolls and carried:—"That Messrs. Grey and Beaver be empowered to write to Mr. Anstead and to protect the interests of this Association by taking any steps necessary with reference to the experimental plot."

9. S I. P. BENEVOLENT FUND.—Papers in this connection were recorded.

10. RAILWAY FREIGHT.—It was resolved to defer for future consideration certain correspondence in this connection.

11. NEW YORK RUBBER EXPOSITION.—Correspondence recorded.—The Meeting was of opinion that the proposals had come too late for the N. P A. to exhibit any products this year.

12. INDIAN TEA CESS.—This correspondence with reference to green tea was recorded.

13. SUBSCRIPTIONS.—With reference to the arrears of subscription since 1909, the Honorary Secretary was authorised to write off any doubtful subscriptions due for that year and that if members fail to pay their subscriptions by the end of the financial year, after due notice, their names will appear as defaulters in the annual report, as is the system with other associations.

Votes of thanks to the chair and to the O. C., Nilgiri Volunteers, for the use of the room terminated the proceedings.

The Honorary Secretary, on behalf of the members, thanked the Chairman of the U. P. A. S. I. for attending the meeting.

(Signed) E. F. BARBER, *Chairman*,
(„) J. S. NICOLLS, *Hon. Secretary*.

NOTE.—The Annual General Meeting will be held in May.

COFFEE.

Coffee in British East Africa.

The following is from a paper by Mr. T. H. Hilken, published in *The Chamber of Commerce Journal*:—

Coffee is indigenous to East Africa, and a fairly large quantity of native-grown coffee is being obtained in the Nandi district and elsewhere; whilst plantation coffee of the highest quality produced in the country is now selling for 82s. per cwt., at which price the planter is doing remarkably well. The flavour of British East African coffee is particularly fine, and experts predict a bright future for the industry, provided the planter pays proper attention to his estate and to the preparation of the coffee. There is no leaf disease in the country and in order to avoid infection the importation of foreign seed is prohibited. There are some fine ten-year-old plantations which are yielding well, so there can be no question as to coffee being thoroughly established. Those who secure good land while the present low prices obtain, and plant up coffee will assuredly have no cause to regret their venture, provided reasonable care and attention is paid to the growing crop. Suitable land may be taken as costing about £3 per acre, and at least 20s. additional will be required to cover the clearing costs. Indifferent land may require so much extra expenditure to clear it of couch grass and stumps that, even if the first cost is nearer £1 than £3, the eventual outlay will be greater. The better plan is to secure good easily cleared land in the first instance, even if the price appears rather higher than that indicated for other land which may not be so easily cleared. The land is then broken up and planted with cereals in between the rows to assist in meeting the cultivation outlay for the first year and a fairly good return can be secured from beans, peas, &c. In the meanwhile the coffee seed has been sown in the nursery, and when the plants are six to nine months old ("four-leaf high") they are ready for removal to the plantation. A small crop of berries can be gathered in three years' time, and two years later the trees should be in full bearing, when the planter can confidently look for a return of 1s. per tree, as there are two crops a year. A plantation of 160 acres will carry about 60,000 trees which at 1s. each shows an income of £3,000 at the end of the five years' waiting time. Taking the original cost of the land at £3 per acre, adding say £2 for clearing, other 30s. for cultivation with 10s. for sundries, the total outlay is £7 per acre, or £1,120. No allowance being made for interest on the outlay, or for personal maintenance during the period of cultivation, due weight must be given to those items—but catch crops are a set off of some importance. A coffee planting scheme is clearly attractive enough, especially as it can be carried out under ideal health conditions in pleasant surroundings. The Coffee Planters' Association report as follows: " From the date of the first inroduction of coffee, over nine years ago, the industry has steadily developed without a single set-back. The original planters are still increasing their areas under coffee, and new plantations are being opened up yearly.—*Produce Markets' Review.*

A London Report.

A reduction of only 345,000 bags in the world's visible supply during March is smaller than was expected, although the heavier receipts in Brazil compared with last March might have been sufficient to indicate such a result. Operators in the terminal market had, however, looked for a reduction of at least half a million bags, and each month makes it more possible that the total stock at the end of this crop year—that is the end of June —will be very little short of last year, if not actually larger.—*Produce Market's Review.*

RUBBER.

Rubber in Malaya.

Future Prospects of the Industry.

INTERESTING ESTIMATES OF AREA AND OUTPUT.

We have been favoured by Mr. C. C. Malet with the following very interesting calculations about the Malayan Rubber Industry. The figures are the most complete we have seen and they appear to have been compiled with great care and accuracy. Mr. Malet is perhaps an optimist in the matter of productions a few years hence, but there is much in past experience to support his views and we would attach, as he does, great importance to the conservation which should result from increased knowledge of how tapping can be done to greatest advantage ;—

Statistics *re* the planted area under Pará Rubber, in the Malay Peninsula.

These statistics are compiled from the information supplied by the Government surveys, and the Planters' Association of Malaya, etc.

Area planted up to and including the year 1909, and the approximate areas planted each succeeding year since :—

	Areas given in acres.		Estimated.	
	1909.	1910.	1911.	
F. M. S. ...	200,000	60,000	20,000	280,000
Colony ...	96,000	14,000	20,000	120,000
Johore ...	30,000	30,000	20,000	80,000
Kedah ...	4,000	3,000	1,000	8,000
Kelantan ...	4,000	5,000	1,000	10,000
Tringganu ...	—	1,000	1,000	2,000
Total ...	61,000	113,000	63,000	500,000

The estimated area planted with Pará Rubber in the Middle East, at the end of the year 1911, amounts to the following :—

		Acres.
The Federated Malay States		280,000
The Colony of the Straits Settlement :—		
Malacca	65,000	
Singapore Island	20,000	
Province Wellesley	25,000	
The Dindings	10,000	
		120,000
Johore (believed to be actually over 100,000 acres) ...		80,000
Kedah, Kelantan, and Tringganu		20,000
Borneo (B. N. Borneo, Brunei, Sarawak, and Dutch Borneo)		25,000
Cochin China		15,000
South India and Burmah		30,000
Ceylon		100,000
Java, Sumatra and the Islands		200,000
Estimated total (probably quite 1,000,000)		970,000

The above areas do not include many somewhat nebulous areas planted by Chinese and natives, whose value is problematical.

Detailed list of the estimated yearly plantings in the Malay Peninsula:—

Year Planted.	Acreage Planted during the year.	Estimated total acreage at the end of each year.
Between 1876 and 1898 ... say	50 acres.	50 acres.
1898 ...	500 do.	550 do.
1899 ...	1,000 do.	1,550 do.
1900 ...	1,450 do.	3,000 do.
1901 ...	4,000 do.	7,000 do.
1902 ...	8,000 do.	15,000 do.
1903 ...	10,000 do.	25,000 do.
1904 ...	14,000 do.	39,000 do.
1905 ...	35,000 do.	74,000 do.
1906 ...	48,000 do.	122,000 do.
1907 ...	93,000 do.	215,000 do.
1908 ...	48,000 do.	263,000 do.
1909 ...	61,000 do.	324,000 do.
1910 ...	113,000 do.	437,000 do.
1911 ...	63,000 do.	500,000 do.

The estimated average yields per acre for all Malaya, from acreages of different ages, is assumed to approximate the following:—

4 years old trees ...	60 lbs. per acre.
5 do. ...	125 do.
6 do. ...	200 do.
7 do. ...	250 do.
8 do. ...	300 do.
9 do. ...	325 do.
10 do. ...	350 do.

Older trees will not be considered as yielding more than this, as most of them are either cut to pieces by early experiments in tapping, or else being rested from recent overtapping.

On this basis, the yearly outputs for Malaya may be estimated as follows:—

THEORETICAL ESTIMATE FOR LAST YEAR 1911.

Number of acres in tapping.	Ages of trees Years.	Estimated yield per acre, in lb.	Estimated total output in lb.
50	35—14	say 1,000	50,000
500	13	350	175,000
1,000	12	350	350,000
1,400	11	350	507,000
4,000	10	350	1,400,000
8,000	9	325	2,600,000
10,000	8	300	3,000,000
14,000	7	250	3,500,000
35,000	6	200	7,000,000
48,000	5	125	6,000,000
93,000	4	60	5,580,000
215,000			30,162,000

The actual crop for 1911 was only 23,400,000 lbs, however, largely owing to the tremendous drought of March to May, 1911, but also due to

The fact that the bulk of the 1906-1907 plantations were somewhat neglected during 1908-1909, and only produced a small portion of the theoretical yield, the total year's crop being about 6,000,000 lbs. short of the theoretical estimate. This was, however, anticipated largely, and my estimate for the Peninsula, made in January 1911, amounted to 12,000 tons, or 26,880,000 lbs. which could have reasonably been expected but for the drought, which threw all calculations out.

THEORETICAL ESTIMATE FOR THE YEAR 1912.

Number of acres in tapping.	Ages of trees. Years.	Estimated yield per acre, in lb.	Estimated total output in lb.
50	36—15	1,000	50,000
500	14	350	175,000
1,000	13	350	350,000
1,450	12	350	507,000
4,000	11	350	1,400,000
8,000	10	350	2,800,000
10,000	9	325	3,250,000
14,000	8	300	4,200,000
35,000	7	250	8,750,000
48,000	6	.200	9,600,000
93,000	5	125	11,625,000
48,000	4	60	2,880,000
263,000			45,587,000

This is equal to an output for the present year of 20,350 tons.

This crop is not, however, likely to be realised, as a good deal of the older rubber is being rested from recent overtapping, and the younger rubber is in many places still backward from neglect: from which it is however rapidly recovering since the properties were properly financial by the capital raised during the boom.

The crop for the last quarter of 1911 was just under 8 000.000 lbs. so that crops of 9,000,000 lbs., 9,000,000 lbs., 10,000.000 lbs., and 11.000,000 lbs. respectively, may be expected under normal circumstances for each quarter of this year, 1912, amounting to a total of 39,000,000 lbs. equal to about 17,400 tons net for the year.

THEORETICAL YIELD FOR 1913.

Number of acres in tapping.	Ages os trees. Years.	Estimated yield per acre, in lb.	Estimated total output for the year, in lb.
50	37—16	1,000	50,000
500	15	350	175.000
1,000	14	350	350,000
1,450	13	350	507,000
4,000	12	350	1,400,000
8,000	11	350	2,800,000
10,000	10	350	3,500,000
14,000	9	325	4,650,000
35,000	8	300	10,500,000
48,000	7	250	12,000,000
93,000	6	200	18,600,000
48.000	5	125	6,000,000
61,000	4	60	3,660,000
324,000			64,192,000

Estimated total acreage in bearing in the Peninsula, in 1913, amounts to 324,000 acres, yielding a theoretical output of 64,192,000 lbs. of rubber, equal to 21,610 tons net.

There seems to be no particular reason why this yield should not be realised, as the bulk of the area planted since 1905, *i.e.*, 1906-1909, amounting to 250,000 acres, will be yielding very nearly double the crop yielded by the area planted 1906-1908, during 1914.

THEORETICAL ESTIMATE FOR 1912.

Number of acres in tapping.	Ages of trees. Years.	Estimated yield per acre, in lbs.	Estimated total output for the year, in lbs.
50	28—17	1,000	50,000
500	16	350	175,000
1,000	15	350	350,000
1,450	14	350	507,000
4,000	13	350	1,400,000
8,000	12	350	2,800,000
10,000	11	350	3,500,000
14,000	10	350	4,900,000
35,000	9	325	11.375,000
48,000	8	300	14,400.000
93,000	7	250	23.250,000
48,000	6	200	9.600,000
61,000	5	125	7,625.000
113,000	4	60	6,780,000
437,000			86,712,000

This is equal to 38,700 tons net for 1914.

Acres.	Years.	lbs.	For the year 1915. lbs.	For the year 1916. lbs.
50	39—18	1,000	50,000	50,000
500	17	350	175,000	175,000
1,000	16	350	350,000	350,000
1,450	15	350	507,000	507,000
4,000	14	350	1.400,000	1,400,000
8,000	13	350	2,800,000	2,800,000
10,000	12	350	3,500,000	3,500,000
14,000	11	350	4,900,000	4,900,000
35,000	10	350	12,250,000	12,250,000
48.000	9	350	15,600,000	16,800,000
93,000	8	350	27,900,000	30,225,000
48,000	7	350	12,000,000	14,400,000
61,000	6	350	12,200,000	15,250,000
113,000	5	350	14,125,000	22,600,000
63,000	4	350	4,780,000	7,875,000
500.000			111,537,000	133,082,000

Five hundred thousand acres is the estimated total area planted up to 1911.

The above total yields amounting to about 49,790 tons net for 1915; and to 59,410 tons net for 1916.

It would seem that nothing less than an adequate supply of tapping labour could prevent these yields from being realised, as the higher yields from the better cultivated areas would compensate the smaller yields from the poorer plantations, etc., and, areas gone out of cultivation.—*Straits Times*, March, 21.

African and Eastern Plantations.

During quite recent times there has been considerable activity in East, West and Central Africa in connection with plantation work. On the West Coast comparatively large areas have been planted with *Hevea brasiliensis*: on the East Coast, in much drier climates, extensions have been mainly of *Manihot glaziovii* (Ceará); and in Central Africa all kinds appear to have been experimented with from time to time. The cultivation of climbers or lianes, though these plants abound only in many parts of Africa, has not been continued even by those Government departments who were originally responsible for much encouragement to natives in this particular direction. It is true that rubber plantations in Africa have not had so long a life as in the East, but at the same time it must be admitted that many African companies have been in possession of a large number of mature rubber trees, and have been drawing large supplies of rubber therefrom. The experience has been long enough to enable the investing public and those who influence it to form some sort of an opinion as to the probable results in the near future.

We do not think that many investors would care to take a deep interest in African plantation developments at the present time for the simple reason that so many of them have experienced bitter disappointment. It will, we think, be admitted that most thoughtful investors looked to the Mabira and Mubesa Plantation Companies as among the best in Africa. The management of these Companies is above suspicion and the Directors are among the most influential and best known in the City. But even with these companies considerable difficulties associated with pioneering, labour, and European management have been experienced which have had a marked effect on the sources of revenue. Other African plantation companies have not enjoyed the spells of prosperity which, those mentioned above, have, and in many cases we doubt whether some of them will not soon be in very low water. This is particularly true of several companies formed during the boom of 1910.

The fault does not appear to lie in the soil or the climate so much as in labour and European management. There are large tracts of land in East Africa which will grow Manihot as well as any other part of the world and similarly extensive acreages for the cultivation of Hevea are available in West and Central Africa. In some areas labour is only too plentiful; in others a minimum wage of one shilling per day has no attraction to the native who can live on much less. As in Java and South India, there is no lack of native population, but there is a distinct aversion to anything like task work such as that demanded on the average plantation. Then again in most African areas there are very few organisations such as those in Calcutta, Colombo, Penang, Klang, Singapore, Batavia and Medan, which exist solely for controlling the development of estates; local agency work in connection with African plantations is not in the least popular, though in the East it is, without doubt, indispensable.

It may transpire that with a few more years' experience the managers of African plantations will be more competent to deal with estate problems and that our grumble is premature.

We, on the other hand, cannot help feeling dissatisfied at the results so far obtained. It is because we are anxious that every source of supply shall receive the necessary technical and financial support that we ventilate our grivance in the hope that the difficulties will be overcome. So far the yields of rubber from mature trees on African plantations have been small. *Funtumia elastica* appears to have very much like *Ficus elastica* (Rambong) in so far that copious yields on first tappings give way to unprofitable yields very quickly and a long rest is necessary before economical tapping can be indulged in. Manihot to judge from the published reports of well-known East African companies does not give more than 12 to 15 ounces per tree per annum. Such yields compare very badly with those from three to four year old Hevea trees in Malaya; when contrasted with the yields from older Hevea trees in the East, they make a very poor showing

It is true that some Eastern estates appear to have been tapped as vigorously as they possibly could and perhaps the high yields recorded in the past will not be annually repeated; should this transpire, the Manihot and Funtumia trees may be in a better position, comparatively. We are led to acknowledge somewhat severe tapping on Eastern estates by the statement made by the Chairman of the Pataling Rubber Estates, at the ninth annual meeting recently held. After pointing out that tapping costs were 12'73 cents for 1911, as against 9½ cents for 1910, the Chairman stated that the manager " attributes this to the old rubber not yielding as it did last year, and to the extra expense of overhead tapping. Mr. Harvey realised, some months ago, that the older fields, which in previous years had responded so well as long as the virgin bark lasted, were feeling the exceptional drought and that the renewed bark was taking more time to attain sufficient thickness to be operated upon. Attention was then drawn to overhead tapping but it was found unsatisfactory in yield and expensive altogether and he was advised by the Board that they wished the resting policy fully carried out until the renewed bark had attained its proper thickness." There is no clear statement that the trees had been over-tapped but the trend of the Chairman remark is very much to that effect. That a company paying such large and handsome dividends should, in its ninth year of existence, have to admit that tapping overhead had been adopted is serious. There may be some excuse for young companies, having no previous experience, and being desirous of entering the dividend stage, tapping the trees in an exacting manner; but there can be no satisfactory explanation of such faulty work on estates as old as Pataling.

We would give a much heartier welcome to a policy which, though it necessitated the payment of a small or reduced dividend, entailed cautious tapping and the preservation of the trees in a healthy, strong condition. It must not be forgotten that tapping operations have a marked effect on the reserve food supplies and the recuperative powers of the trees. Drastic or too frequent tapping, whether of Hevea, Mahihot, or Funtumia trees, means a lowering of annual yields and premature death. A long and healthy life for the trees should be aimed at. This can only be assured by removing the minimum quantity of bark and allowing the maximum period of time for renewal of bark.—*India-Rubber Journal.*

A Standard for Plantation Rubber.

In respect to German East Africa Dr. Marckwald, of Berlin, has urged that only the production of a high grade pure and uniform article of the first standard of merit will render it possible for the Colony to hold its position in the impending keen competition. The hint is worth noting in Southern India.

The Planters' Chronicle.

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THE U. P. A. S. I.

(INCORPORATED.)

The Scientific Assistant in Mysore.

Mr. G. N. Frattini arrived in Bangalore on the 6th instant and assumed charge of his appointment the same day.

Until about the 23rd instant he will remain at the headquarters of the Association, where, under the supervision of Mr. Anstead, he is studying the records of the scientific work that has been done in the Mysore planting districts already. He is also discussing with the Scientific Officer lines of work that are likely to have to be undertaken in those districts in the future, thus preparing the way for effective collaboration.

It has been arranged to hold a meeting of the three District Planters' Associations in Mysore at Chikmagalur on May 25th, when Mr. Anstead and Mr. Frattini will be present. Delegates from Coorg have been invited and have replied that they hope to attend.

Mr. Frattini has been fortunate in having come into touch already with several well-known Mysore planters, who have happened to be visiting Bangalore during the current week.

The Attur Ghat Road.

In a G. O., No. 493 L., dated 28th March 1912 the Madras Government observe:—

"As the local residents and landholders interested in the maintenance ot tho Attur Ghât road are only willing to contribute Rs.373 in order to supplement the annual allotment which the District Board of Madura is prepared to make for the upkeep of the road, the Government regret that they see no ground for a reconsideration of the decision embodied in G. O. No. 1317 L., dated 10th October 1910, not to make any provincial grant-in-aid for the purpose or to insist upon the District Board's maintaining the road in proper order."

It appears that the three estates owned by Europeans in the Kodaikannal and Dindigul taluks represent a total area of about 838 acres; of which only 595 could be counted upon for contributions at 8 annas an acre.

Indians own about 4,364 acres, and only one owner (who has 747 acres) is prepared to contribute; his offer being Rs.500 down or Rs.75 annually.

Scientific Officer's Papers.

XCVIII.—LEGUMES AND BACTERIA.

Modern research on the Nitrogen gathering power of Legumes has led to their systematic use as green manures. All green manures are valuable because they prevent the loss of soluble plant food and because they add humus to the soil. This humus is valuable because it improves the physical properties and chemical composition of the soil. In addition to these advantages, which are common to all green manuring crops, plants belonging to the Legume family possess the power of adding nitrogen to the soil. Broadly speaking therefore, the non-leguminous crops used for green manures affect the fertility of the land by modifying the transformation of the soil nitrogen. They take up the soluble nitrates and transform them into insoluble proteins. When dug in they decay and become food for vast hosts of soil bacteria which resolve them into simpler substances, ammonia and nitrates, as well as a humus richer in phosphoric acid, potash, and lime. The green manuring crops of the legume family accomplish all this and further modify the composition of the soil by the addition to it of nitrogen.

This nitrogen they are able to obtain largely from the air by the aid of certain kinds of bacteria which live in symbiotic relations with them in nodules formed on their roots. The bacteria obtain mineral food from the host plant and the latter obtains nitrogen from the bacterial activities. Thus legumes are able to obtain nitrogen in two ways, normally from the nitrates in the soil water absorbed by their roots, and also from the air by the aid of the nodule bacteria. The consequence is that their tissues, especially their leaves, contain a higher percentage of nitrogen then those of non-leguminous plants. This is plainly shown in the following table which gives the nitrogen content of the leaves of a number of plants. These figures are quoted from the Annual Reports of the Mysore State Agricultural Department and other sources.

Name of Plant.		Nitrogen per cent. in dry leaves.
LEGUMINOUS.		
Indigofera sp.	Yairdee Biloo	2·66
Tephrosia tinctoria		2·66
Tephrosia candida		2·03
Albizzia	Whotungay	1·79
Dalbergia latifolia	Beete	1·59
Erythrina indica	Dadap	1·40
NON-LEGUMINOUS.		
Artocarpus integrifolia	Halasa	1·06
Ficus infectoria	Kare Busri	0·93
Ficus glomerata	Attee	0·91
Ficus Mysorensis	Gonee	0·82
Lettsomia	Ugani hambu	0·63

The way in which the bacteria form nodules on the roots of legumes is admirably described by Dr. L. C. Coleman, M.A., Ph. D., in the first Bulletin of the General Series recently published by the Mysore State Agricultural Department, on the subject of "Green Manuring in Mysore" where also will be found some excellent micro-photographs showing the bacteria in the cells of the nodules.

The following account of the relations between the bacteria, the legume, and the nitrogen is extracted from J. G. Lipman's book "Bacteria in relation to Country Life."

"The legume bacteria are widely distributed in the soil and are present in streams and lakes. The particles of dry soil which are carried by the wind may have adhering to them one or more of these organisms; hence wild legumes may be enabled to establish themselves in new places because of the occasional infection by bacteria brought by the wind. The formation of nodules occurs only on the younger parts of the roots. Under proper conditions the germs that come in contact with the root-hairs penetrate them and by means of filaments make their way towards the interior of the root branch. There is no regularity in the arrangement of the nodules on the roots, since infection may occur in different places and at different times. The bacteria that enter the legume roots are very small and rod shaped, but within the nodules they assume various shapes and sizes. In different plants they appear as irregular rods or pear, X, or Y shaped. These irregular forms, called bacteroids, are characteristic in some of the legumes. The organisms that find their way into the legume roots multiply there rapidly and increase to enormous numbers. The small rod shaped forms are rather abundant in the young nodules but, as the latter grow older, the larger irregular forms become more and more numerous. Later still these bacteroids are dissolved and absorbed by the host plant. Not all the organisms are absorbed, considerable numbers remain in the partly emptied nodules. On the decay of the latter the surviving bacteria find their way back into the soil, where they probably derive nourishment from the humus until a new opportunity is given them to enter the roots of some legume. Soils which frequently bear crops of legumes are richer in nodule bacteria, as the greater the number of plants the greater the number of bacteria which escape back into the soil from the decayed nodules. The exact relations between the plants and the bacteria are not yet fully known. The plant appears to offer more or less resistance to the entrance of the bacteria and the latter must be sufficiently vigorous to overcome this resistance. When an abundance of available nitrogen is present in the soil, or when nitrates are applied, the formation of nodules is partly or wholly suppressed. This suppression is explained by the assumption that the bacteria can enter the roots of legumes only when the latter are in a weakened state, as is true for example of plants growing in nitrogen-poor soils. The young plants in such soils finding but meagre quantities of combined nitrogen to supply their needs soon turn yellow and pass into a state of nitrogen hunger. In this weakened state they have but slight power of resistance and the nodule bacteria find it comparatively easy to enter their roots. On the other hand legumes growing in soils well supplied with available nitrogen remain vigorous and retain a high power of resistance, thus precluding the entrance of bacteria. After some nodules are formed the formation of additional ones becomes more difficult because these plants are better supplied with nitrogen and their vigour and resistance is increased. In considering the greater or slighter resistance power of different plants under different conditions it should be remembered that the bacteria may display differences in their ability to penetrate the legume roots as well as in their ability to fix atmospheric nitrogen when developing within the nodules. The term *virulence* is used to designate this variable power of bacteria. Organisms of a high degree of virulence readily penetrate the roots and secure large quantities of nitrogen from the air. Organisms of a low degree of virulence are feeble in this respect. Under favourable soil conditions their virulence may be greatly diminished. Hence soils well provided with lime and humus, soils in good tilth, well aerated and supplied with abundance of moisture will favour the fixation of large quantities of atmospheric nitrogen. On the other hand ill-drained soils, or those deficient in humus, will tend to diminish the virulence of the nodule bacteria to the injury of the legume crops that are grown on them. The conception of resisting power of plants on the one hand, and that of the virulence of the bacteria on the other, introduces a third conception of a balance between the two. The resistance of the plants must not be too great to exclude the bacteria, the virulence must not be great enough to prevent the plant from securing the nitrogen fixed by them. It is only when the true balance is established that a condition of symbiosis is reached. It is conceivable that the virulence of the bacteria may be augmented to such an extent as to enable them to retain all the nitrogen fixed by them for their own purposes. In such a case the bacteria would contribute nothing to the growth of the host plant but would rather constitute a drain on its starches, sugars, and mineral salts: in other words they would become parasites.

RUDOLPH D. ANSTEAD,
Planting Expert.

TEA IN ISPAHAN.

The import of tea into Ispahan would appear to have been steadily declining since 1904. This decrease may be due in part to the increased duties imposed by the tariff of 1903, in part to the large stocks of tea held over from 1903 or previous years. The chief cause, however, is the importation of tea *viâ* Russia. Ispahan has ceased to occupy the position which it did formerly of a distributing centre for Teheran and the Caspian provinces, which are now supplied from Russia, transport being cheaper by the northern routes and greater facilities in regard to payment being afforded by the Russian banks. More recently, owing to the unsatisfactory condition of the Shiraz and Ahwaz routes, Ispahan has also ceased to serve as a distributing centre for the west of Persia, a position which—thanks to the relative security of the Kermanshah road—has been usurped by Hamadan. Thus the import of tea to Ispahan is now limited to the demands of the town itself and the immediately surrounding districts, *i.e.*, an area within a radius of about 40 to 50 miles. The import thus restricted of recent years is estimated by experts to average about 6,300 chests per annum, of which Ispahan itself consumes about 60 per cent.

The greater portion of the Ispahan tea trade is in medium and inferior qualities of Indian teas. These constitute about one-half of the total import. Next come Chinese and Java tea in the proportion of about two-thirds of the former and one-third of the latter.

Practically the whole of the tea imported to Ispahan is brought from the south. A very small quantity of Indian and Chinese teas is imported from the north and is known and sold in Ispahan as Russian tea.

The tea trade is almost entirely in the hands of native merchants. Small quantities of China tea are from time to time imported by a British firm. In view of the condition of the southern roads during 1910-11, experts anticipated a falling-off in the import of tea to Ispahan. The contrary, however, proved to be the case. The unusually large arrivals during the March quarter. 1911 (about 2,000 chests), of tea from the south-chiefly by the Shiraz road-proved that Ispahan had begun to feel the influence of the large increase—as shown by the reports of the Calcutta Tea Brokers' Association—in the export of tea from India to the Persian Gulf, which was about 35 per cent. greater in the season 1910-11 than in that of 1909-10.

DISTRICT PLANTERS' ASSOCIATIONS.

Central Travancore Planters' Association.

Proceedings of the 1st Quarterly Meeting of the Central Travancore Planters' Association held at Stagbrook Bungalow on Saturday, 20th April, 1912, at 10 a.m.

PRESENT.—Messrs. F. Bissett (Chairman), T. C. Forbes (Vice-Chairman), J. F. Fraser, J. A. Richardson, H. C. Westaway, F. E. Thomas, J. H. Ellis, J. S. Wilkie, W. A. J. Milner, F. W. Winterbotham, A. R. St. George, W. G. Haslam, E. C. C. Evans, R. S. Payne. R. A. Fraser (visitor), and R. E. Haslam (Honorary Secretary),

The Minutes calling the meeting were read.

The Proceedings of the last General Meeting were confirmed and taken as read.

CORRESPONDENCE.—Read letter from the Postmaster-General, Madras, dated 29-3-12. Read letter from the Superintendent, Cardamom Hills, dated 16-4-12. Read telegram from the British Resident in Travancore, dated 18-4-12. Read letter from the Secretary, U.P.A.S.I., No. 9/12, dated 21-2-12. It was resolved: "That Mr. J. Carson Parker be thanked for his endeavours to obtain the bonus on green tea." The Honorary Secretary was instructed to write accordingly. Read letters from the Secretary, U. P. A. S. I., No. 1/12 dated 2-1-12, No. 2/12 dated 6-1-12, No. 3/12 dated 8-1-12, No. 4/12 dated 19-1-12, No. 7/12 dated 2-2-12. Read letters from the Secretary, U.P.A.S.I., No. 13/12 dated 18-3-12, No. 14/12 dated 23-3-12. It was proposed by Mr. J. A. Richardson and seconded by Mr. T. C. Forbes and carried unanimously: "That the Secretary of the U.P.A.S.I. be asked to approach the Indian Tea Association in the matter of a subscription towards sending an exhibit of Tea along with Rubber and other produce to the New York Rubber Exposition." The Honorary Secretary was instructed to write accordingly. Read letter from the Honorary Secretary, Mundakayam Rubber Planters' Association, dated 7-2-12.

TOLLS.—Proposed by Mr. H. C. Westaway and seconded by Mr. F. E. Thomas: "That with reference to the resolution passed at the last meeting *re* the non-payment of tolls by this Association—that this be rescinded."—Carried unanimously.

VAGAI VALLEY RAILWAY.—It was resolved that the Honorary Secretary be asked to write to the Kanan Devan Planters' Association in support of their efforts towards the early construction of the Vagai Valley Railway and also to the Charman of the Madura District Board on the same subject.

CART HIRES.—Proposed by Mr. J. A. Richardson and seconded by Mr. J. H. Ellis: "That all Estates be asked to send to the Honorary Secretary cart hires that they are paying at the present time."—Carried unanimously.

Resolved: "That the Honorary Secretary be asked to write to Mr. and Mrs. D. G. Cameron expressing the regrets of the members of this Association on their departure from Travancore."—Carried unanimously.

With a vote of thanks to the Chair the Meeting terminated.

(Signed) R. E. HASLAM,
Hon. Secretary.

South Travancore Planters' Association.

Proceedings of the First Quarterly Meeting held at Quilon Club on Saturday, 27th April, 1912.

PRESENT.—Messrs. J. Stewart (Chairman), D. G. Cameron, R. Ross, L. G. Knight, Chas. Hall, A. S. Marten, H. S. K. Morrell, H. W. Heberden and A. W. Leslie (Honorary Secretary). *Visitors*: Geo. Croll, J. Mackie, and Meek.

The Proceedings of the last meeting were read and confirmed.

SRI-MULAM ASSEMBLY.—Our representative, Mr. D. G. Cameron, read his report as follows:—

Gentlemen,—My report as your delegate to the Sri-Mulam cannot otherwise than be brief as there is practically nothing to say—the Association's views in regard to Game Laws having already been sent to Government, and in regard to the Forest Rules I was unable to get a copy of these until after the Meeting at the assembly although I had several times applied for them. In reading them over it does not occur to me there is anything which materially affects the planting interests. Certainly not anything which we could hope to get modified by reference to Government. No doubt these rules have been made up in the interests of the Forest Department, and I suppose one would hardly expect it to be otherwise. The notice published in the Gazette in regard to fires within the reserve during the dry weather does not apply to the burning of clearings, I take it. In regard to Game Laws, I emphasised what the Association had said in their resolution about a close season, and although I got no definite promise that we should be consulted before this was fixed on and published in the Gazette, I gathered from the Dewan's reply that Government looked on the Association's request as a reasonable one, and I myself believe your request will be granted.

NEW YORK EXPOSITION.—Read various circulars from Secretary, U. P. A. S. I., and resolved: "That owing to the general lack of support in South India this Association sees no prospects of Southern Indian exhibits."

U. P. A. S. I. ANNUAL MEETING—ELECTION OF DELEGATE.—It was proposed by the Honorary Secretary and seconded by Mr. R. Ross: "That Mr. H. W. Heberden be appointed our representative at the next Annual Meeting in Bangalore."—Carried.

DEPARTURE OF MR. D. G. CAMERON.—The Chairman, Mr. Stewart, before the Meeting closed, said:—

Gentlemen,—As you all know, we are losing one of our oldest and most esteemed members, Mr. Cameron, who is about to retire. I speak the opinion of all the planters, both past and present, in proposing a very hearty vote of thanks to Mr. Cameron for all he has done for this Association, and coupled with the name of Mrs. Cameron for their many acts of kindness to planters. I have much pleasure as Chairman in proposing this vote of thanks and in asking you all to join me in placing it on record. Hear, Hear, and Cheers.

Mr. Cameron most feelingly replied. With a vote of thanks to the Chair the meeting terminated.

(Signed) A. W. LESLIE,
Honorary Secretary.

CINCHONA.

Cinchona in Java from 1872 *to* 1907, *being extracts translated from the Scheikundige Bijdragen Tot de Kennis der Java-Kina,* 1872 *to* 1907, *by the late* K. W. VAN GORKOM, *arranged with an introduction by* D. HOOPER.

Vegetable Product Series No. 115 of the *Agricultural Ledger* (1911 —No. 4) consists of an article under the above heading.

The bulk of Mr. D. Hooper's introduction is given below. The rest of the paper is too lengthy for quotation in full and does not lend itself easily to the process of summarising. Planters interested in Cinchona cultivation should procure copies.

INTRODUCTION.

In 1908, the late Dr. K. W. van Gorkom published a pamphlet entitled *Scheikundige Bijdragen tot de Kennis der Java-kina,* 1872-1907. As the pamphlet contains matter of great interest, the Reporter on Economic Products to the Government of India had it translated into English with the consent of the author, and the work of editing the translation was entrusted to me. It has been decided to curtail and re-arrange the matter to make it more useful to Cinchona planters in India. It is, of course almost up to date and supplements van Gorkom's "Hand-book of Cinchona Culture," translated by Mr. B. D. Jackson and published in 1883, and J. C. B. Moens' "De Kinacultuur in Azie, 1854-1882," both valuable histories of the introduction of the industry in the East Indies. Since they appeared, no books have appeared in English describing the wonderful progress made in Java in supplying the world with Cinchona bark and quinine.

A few words are necessary to explain the degree in which this *Agricultural Ledger* has been made to depart from the original. Dr. van Gorkom's pamphlet is arranged chronologically with remarks made on the state of the plantations, describing experiments conducted from year to year. Many subjects are discussed, and so many experiments recorded one after another that it is not easy to follow such an arrangement with satisfaction. In 1888, for instance, the following subjects are dealt with—the composition of the bark of young trees compared with that of their parents; the temperature of drying bark; analyses of root-bark of Ledgers; composition of young Succirubras; influence of grafting. In other annual reports there are scattered references to the influence of different manures on the growth of the trees and composition of the bark. It is not convenient to traverse numerous unattached notes to discover the results of any one series of experiments: therefore the liberty has been taken of breaking up the text into chapters and grouping the paragraphs chronologically under the particular subjects. This method will avoid the repetition of certain statements, and enable the reader to trace the results of the experiments to definite conclusions. It has also been found necessary to omit records of some inconclusive trials and a few controversial passages which do not concern English readers. Eighteen pages are devoted to a discussion on the manufacture in Java of quinium (a preparation of crude alkaloids); this subject as well as the remarks on quinetum have been disposed of in a few sentences. Unfortunately Dr. van Gorkom's death prevented any reference to him after the re-arrangement had been decided on.

It may be of interest to give some biographical notes on the career of Dr. van Gorkom and the other Dutch quinologists, mentioned in the following paper, who have done so much for Cinchona in Java.

Dr. Karol Wessel van Gorkom was born at Zutphen on the 22nd August 1835. He was trained under Professor Mulder at Utrecht, and in July 1855 he was appointed Military pharmacist in the army in the Dutch East Indies. On arriving in Java he was posted to the Military Hospital in Batavia, and in 1857 he became assistant in the Agricultural Chemical Laboratory at Buitenzorg. It was not until 1864 that van Gorkom took charge of the Government Cinchona Plantations, owing to the death of Dr. Junghuhn, and a better appointment, as the results show, could not have been made. The state of the gardens at the time Dr. van Gorkom thus described: "The Cinchona plantations were scattered at that time in the shaded forests and of little importance; and ten years of labour on them had led to but little result of practical value. Residents in the Indies laughed at the Government for attempting the cultivation, ridiculing it as an expensive hobby, and remarking that no good results could be seen after so many years. Cinchona growing was said to be a hobby of the two succeeding Governors (Pahud and Sloet van de Beele); and private people could not be induced to embark on it even experimentally.

"Meanwhile at home in Holland, the Colonial Secretary was continually addressed about the real or imaginary disappointments and the slowness with which the young enterprise was developing, in comparison with the one started in British India.

"The hopes that had attended the commencement of the culture in Java were gone, and the public had turned against the enterprise. The criticism in the daily papers went so far that the Governor-General Sloet van de Beele was obliged to ask Junghuhn and Teysman to put an end to the discussion.

"Under these circumstances," continues van Gorkom, "I began the management of the cultivation, and endeavoured to adopt such measures and regulations as would lead to a reasonable development of the plantations. My exertions were made lighter by experience, in so far as we had learned at least not to follow in the footsteps of Junghuhn.

"In British India, where the alleged success in acclimatising Cinchona had been pointed out as an example, methods quite opposed to those of Junghuhn had been taken, and I accordingly thought it best to take the middle way and work gradually to the best system.

Van Gorkom set as his first and foremost aim the increase of his stock of Cinchona trees, because, as he says, without trees there could be no product and no profit, nor an opportunity of judging the practical value of the undertaking. The history of the culture for years had shown that the stock at his taking over might have been greater, for those species which had been reared were the best, but the uninterrupted development of the plantation was hindered on account of the disease known as *Helopeltis*. All observations had shown that, but for this pest, Cinchona plants would thrive just as well as any other plant in Java.

Since 1864 it was his aim to obtain fresh seeds and plants from America and to exchange with the British Indian gardens. Gradually rich species were thus obtained; from British India he received *C. officinalis* and *C. succirubra*; and at last from America in December 1865 came the seeds of the Cinchona which was afterwards known as *Ledgeriana*.

He continues:—"It was not until 1872 that we were so far advanced, owing to improvement both in material and in chemical analyses, as to restrict ourselves to the rearing of *C. Ledgeriana* and *C. officinalis* for producing bark for the manufacture of quinine, and to the rearing of *C. succirubra* for producing pharmaceutical bark. In the early years there was not time for experiments other than those directly bearing on the growth and multiplication of the trees: they were considered premature, and such as were carried out were not done with such enthusiasm."

The above indicates the spirit in which van Gorkom undertook the direction of the industry. Added to his scientific training, he had the merits of a planter and was a good administrator. The forced labour that had been used in the plantations till 1864 was replaced by free labour; the prophecy that this would ruin the culture was not fulfilled. Private Cinchona planters in the island were always sure of his disinterested advice and help. He states in his pamphlet that "the undertaking of the cultivation of Cinchona was not intended for speculative purposes, but that humanitarian motives led to the experiment." These high principles characterised his successful management and his subsequent writings. Van Gorkom remained in charge of the Cinchona plantations until March 1875. From 1875 to 1878 he was chief Inspector of Cultures. He retired from Government service in 1880 after 22 years' residence in the East. In his retirement he wrote frequently on Indian economic subjects and took the utmost interest in the welfare of the Netherlands East Indies. . . . .

The idea of cultivating Cinchona in Java is reckoned to have taken shape in 1854; but not until some years afterwards did chemical researches begin—researches which have marched so steadily with the devolopment of the plantations.

It was, in fact, only in 1870 that Cinchona culture in Java had become so far advanced as to supply material with success for the commencement of systematic chemical research. Proposals were made in that year to associate a chemist with the culture, and at the same time a scheme or working-plan was formed for the solution of the problems nearest to hand.

The appointment of the chemist took place in May 1872, and since then every annual report of the Government has contained an important paragraph headed "Scientific Researches." The pages which follow are based on these paragraphs often quoted *verbatim*, and in that case marked by inverted commas.

It is well as a preliminary to state what steps had been taken prior to 1872 by the nations of Europe to ensure a supply of quinine in the event of South American Republics allowing their forests to be so worked out or their very limited plantations so to fail, as to starve the market. In the first place came France: La Condamine first tried to establish one species in French Guiana, but failed: and tried too to send living plants to France, but his vessel was lost at sea: next, at the instance of the botanist and traveller Weddell, the French Government wished to establish Cinchona in Algeria. Weddell had returned from South America with seeds of a Cinchona which were sown under the care of a M. Houllet in Paris, and germinated. Some of the young plants were sent in 1849 to Algeria to M. Hardy at Hammah; but they failed,—"Killed by the Sirocco" was the report. English and Dutch botanists were meanwhile urging on their Governments to attempt to introduce the trees into the East. The Dutch Government moved first, sending in 1852 Hasskarl to South America (under the name of Muller,—for secrecy was necessary, and a great amount of caution and courage), and Hasskarl first sent seed to Holland, and then himself was taken off at Callao by a Dutch war-ship with 21 cases of young plants (several hundreds), and brought to Batavia with his precious cargo at the end of December 1854.

The English Goverment moved in 1858, sending Mr. (now Sir) Clements Markham to Bolivia and South Peru, where he organised a threefold expedition, one part under Mr. Pritchett, one part under Messrs. Spruce and Cross, and the third under his own guidance. Sir Clements Markham had to get his cases of living plants down to the coast by stratagem. Cross went back and made a second expedition in 1861 and a third in 1868. In 1865 an Englishman, C. Ledger, was so fortunate as to get from an Indian a packet of particularly valuable seed, which he sent to a brother at London; a part of it was sold privately to British India, and part to the Dutch Government—its value being altogether unsuspected by the sellers. Meanwhile from 1865 forward for a few years the Dutch Consul-General—Roldanus—at Caracas obtained other seed for Holland.

Mention has not been made of the botanist and traveller Karsten, who travelled in Venezuela and New Granada (chiefly the latter) from 1844 to 1856. He introduced *Cinchona lancifolia* into European cultivation.

These above are the names of the men who at much risk, before the time when the present history begins, got for European medicine the supplies of seed whence sprung the plantations in the East.

In 1872, when this history opens, Java possessed:—

(i.) A stock of *Cinchona Calisaya* derived from a plant obtained from Paris out of Weddell's seed and sent to Java in 1851 where it arrived more than four months later in April 1852.

(ii.) A stock of plants raised from the seed bought from Mr. L. Ledger in 1865—*Cinchona Ledgeriana.*

(iii.) A stock of plants derived from Schuhkraft's sendings—*Cinchona Calisaya.*

(1). A stock of *Cinchona Calisaya* derived from a plant obtained from Paris out of Weddell's seed, and sent to Java in 1851 where it arrived after a voyage of more than four months in April 1852. It is here called *C. Calisaya javanica.*

(2). A stock of plants of the same species derived from Hasskarl's missions, partly raised from seed in Java, and partly the progeny derived from seed sown in Holland, and shipped alive to Java in 1855. This also is called here *C. Calisaya javanica.*

(3). A stock of plants of the same species but of a slightly different variety, derived from seed sent by Schuhkraft, here called *C. Calisaya* of Schuhkraft.

(4). A stock of plants raised in Java from seed sent thither from Madras in 1866 by McIvor.

(5). A stock of plants of *Cinchona Ledgeriana* (at first thought to be *C. Calisaya*) raised from the seed bought from Mr. Ledger in 1865.

(6). *Cinchona Pahudiana* (at first called *C. ovata*) derived from Hasskarl's mission, and raised partly from seed in Java, and partly from seed grown in Leyden whereof the young plants were transported to Java by Junghuhn in 1855, and perhaps derived also from plants brought alive by Hasskarl. Its extensive cultivation had been abandoned in 1862.

(7). A stock of plants of *Cinchona officinalis* raised in Java from seed sent in 1865 from Madras, and sent also later from Bengal, Madras and Ceylon.

(8). A stock of plants of *Cinchona succirubra* received from Bengal in 1862 and from 1866 onwards from Bengal, Madras and Ceylon.

(9). Plants detected as mixed with *Cinchona Calisaya* from Hasskarl's mission and named *Cinchona Hasskarliana*—thought by some to be hybrids.

(10). *Cinchona micrantha* raised from a plant received accidentally in 1862 from British India with *C. succirubra*.

(11). *Cinchona caloptera*, from plants derived from Hasskarl's mission, where they were mixed with *Cinchona ovata*, and also plants raised from seed sent from New Granada in 1870.

(12). *Cinchona lancifolia* from seed collected by Karsten in America and given by him in exchange to the Governor of Surinam for the Dutch Government, raised at Leyden and sent to Java in 1855 under the care of Junghuhn.

(13). *Cinchona pubescens*, one plant probably brought from Holland.

(14). Plants from Hasskarl's mission, called *Cinchona lanceolata*, and apparently a race of *C. ovata*.

Reports show that at the end of 1871 the following numbers of plants were in cultivation:—

1,009,000	*Cinchona Calisaya.*
164,000	*Cinchona succirubra.*
188,000	*Cinchona officinalis.*
16,000	*Cinchona lancifolia.*
1,050	*Cinchona micrantha.*

At the end of May 1872 Mr. J. C. Moens was able to start his analytical investigations at Bandoeng. His first duty was to subject the different species of Cinchona which had been brought into cultivation to a comparative examination. in order to ascertain the kinds that might be considered best for multiplication. Of *C. Pahudiana* and *C. lanceolata*, which had already been rejected, there was no need to take account. The main question was, therefore, to compare the values of *C. succirubra*, received from British India, and of *C. Calisaya*, which had been grown from seed successively provided by Dr. Weddell, Dr. Hasskarl, Schuhkraft, Ledger and the British. Indian Government. These plants were distinguished by name as follows: *C. Calisaya javanica*, to which belonged, besides the plants obtained from Hasskarl's expedition, the stock of the quinine plant reared first in Paris from seeds collected by Weddell in South America and presented to the horticultural garden at Leyden in 1851; *C. Calisaya* of Schuhkraft; *C. Calisaya anglica* and *C. Calisaya* of Ledger. These five sorts of *Calisaya* varied as much in appearance as they varied in origin, and even individual plants of each class showed on comparison remarkable variation, especially in form and colour of the leaf. The *C. Calisaya anglica* certainly diverged most by having larger leaves, and also on account of its quick and robust growth. Presumably it was a hybrid of *C. Calisaya* and *C. succirubra*. The original plants of the Calisaya species received before 1864 were called *C. Calisaya javanica*.

REPORTS OF COMPANIES.

Travancore Rubber Co.

The annual report of the Directors of the Travancore Rubber Co. states that the balance at the credit of profit and loss account, including £1,060 brought forward, amounts to £4,934. After writing off preliminary expenses amounting to £1,061 the Directors have declared a dividend of 10 per cent., less tax, carrying forward £758. The average gross price received in London was 4s. 8d. per lb. The crop totalled 29.560 lbs. The estimated crop for the curreut year is 67,000 lbs.—*India-Rubber Journal.*

Orkaden River (Travancore) Rubber Co.

The Directors of the Orkaden River (Travancore) Rubber Co. report that the profit and loss account shows a credit balance of £558, which it is proposed to carry forward. The total capital expenditure during the year amounted to £4,367. The crop harvested totalled 4,465 lbs. and the gross price received in London was 4s. 8*d.* per lb. The crop for the current year is estimated at 10,000 lbs. During the year 274 acres were cleared and planted with Pará rubber.—*India-Rubber Journal.*

Paloor (Travancore) Rubber Co.

The Directors of the above Company report that the capital expenditure during 1911 amounted to £2,018. Although light tapping might have been commenced last year, it was considered advisable to delay starting until this season. It is estimated that from 6,000 lbs. to 7,000 lbs. will be secured this year.—*India-Rubber Journal.*

PROGRESS IN TRAVANCORE.

Apropos of the reports of some Travancore Rubber Companies, including those mentioned above, the *Rubber World* observes:—"It would be unfortunate if the troubles of the Ceylon Travancore Rubber and Tea Estates were to prejudice the public mind against Travancore planting companies. There is, indeed, no more reason why they should do so than there is for their affecting opinion as to Ceylon enterprise. The truth is that Travancore companies are doing exceedingly well, and for most of them the future is full of promise. Southen India in the next year or two should give an excellent account of itself. The Travancore produced 28,600 lbs. of rubber in 1911, and should produce 80,000 lbs. in 1912; its offspring; the Orkaden River will do 10,000 lbs. in 1912, if not more, and the Paloor, under the same auspices, will do some 7,000 lbs. The Rani Travancore, in 1911, did 193,750 lbs. and is expected to do 325,000 in 1912; the Periyar estimated to do 150,000 lbs. in 1911: the Stagbrook 30,000 lbs., and should do 75,000 lbs. in 1912; the Poonmudi 6,700 in 1911, and has produced as much in two months of this year; the Malayalam produced 35,858 lbs. in 1911, and will, undoubtedly, show a big advance in 1912: the Central Travancore did 9,217 lbs. in 1911, and will probably do 70,000 lbs. in 1912; and so on. Most of the Travancore companies have the advantage of tea as well as rubber. The Travancore Tea Estates, which have gone in for rubber also, last year paid 35 per cent. on their ordinary shares after making allowance for the cost of rubber development. In 1910 the Periyar distributed 47 per cent. The Malayalam, the Stagbrook, and the Poonmudi have paid dividends already, and others have either reached the dividend-paying point or will shortly do so. The next year or two will see Travancore in the market as a serious competitor with Ceylon and Malaya; it has proved that it can grow rubber as well as either, and 1912 should mark an important stage in its progress."

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THE U. P. A. S. I.

(INCORPORATED.)

The Scientific Assistant for Coorg.

Mr. Lewis Gordon Jonas has been offered, and has accepted, the appointment of Assistant Scientific Officer to this Association, for work specially in Coorg.

Now 22 years of age, Mr. Jonas was educated at Bengeo, Haileybury, and University College, London, where he matriculated in the first division, specialising in Chemistry.

After leaving University College he joined the firm of Messrs. Harper Brothers, Great St. Helens, London, and was placed in a position of considerable responsibility in the works of the British Aluminium Co-operation at Plas-Rhyder, in North Waies. He next obtained an appointment under the Marconi Co. at New Klein-fontein in South Africa. Having finished this work, he became science master at the Park Town School, Johannesburg, a position which he relinquished in order to take up the Coorg appointment,

Several members of the Jonas family are distinguished and well known scientists; and it will be seen that Mr. Jonas has had a good scientific training and that he is a chemist.

With a view to his acquiring a special knowledge of Agriculture in relation to its tropical aspect, he will, before leaving for India. undertake a special course of study on lines laid down by the Planting Expert. This will ensble him on his arrival to quickly grasp those problems in the solving of which the Coorg planters are particularly interested.

He will probably assume charge of his new appointment in October next.

The Planters' Labour Act.

THE NILGIRIS.

In the course of his report on the working of the Madras Planters' Labour Act I of 1903 for the year 1911 in the Nilgiri district, accompanied by the usual statement in the form prescribed in G. O. No. 1063, Judicial, dated 14th August 1909, showing the distribution of these cases under the several sections of the Act together with a summary of the sentences imposed in cases convicted under section 24 of tne Act, the Acting District Magistrate of the Nilgiris remarks:—

"The number of prosecutions instituted under the Act fell from 927 to 862. The fall is chiefly traceable to the file of the Taluk Magistrute, Gudalur, where the number of cases filed under sections 23 aud 30 of the Act fell by 19 and 119, respectively, with however a slight increase (17). in the number of cases filed under section 24 of the Act. There were no special causes at work to account for the slight fall (—65) in the aggregate number of prosecutions instituted under the Act which may be attributed to ordinary fluctuation in the working of this special Act. . . .

"As usual, the bulk of the cases was contributed by the Gudalur Taluk. The natural inference is that the conditions of labour there, whether climatic or otherwise, are the cause of the marked difference between this and other taluks. Over 25 prosecutions were laid by each of the under-mentioned estates during the year of report:—

Coonoor and Ootacamund taluks	*Nil.*
Gudalur—	
Glenvans	43
Suffolk	34
Kelly	28
Seaforth	32
Hope	27
Lauriston	29
Daverashola	109
Mayfield	60

"It is noticeable that four of these eight estates appear in the same connection in last year's report, that Suffolk and Kelly which now appear in the above table filed twenty-four and twenty-one cases, respectively, last year, and that Glenvans, Seaforth, Daverashola and Mayfield filed, respectively, 50, 26. 114 and 72 cases last year. It may be remarked that Glenvans, Suffolk, Kelly, Seaforth, Hope and Lauriston are in the O'Valley, where the amount of labour employed is very considerable and where management is said to be good. There is therefore no ground for the theory that prosecutions are numerous on estates where the treatment of coolies is indifferent.

"The heavy pendency in the Gudalur taluk has already been fully reported on and the orders of Government are awaited on this office letter R. C. No. 358 M.. dated 18th September 1911.

"With this exception the Act may be said to have been working satisfactorily during the year under review."

THE WYNAAD.

In his report on the working, in the Wynaad taluk, of the Planters' Labour Act I of 1903, during the year 1911, the Acting District Magistrate of Malabar states:—

"The year was marked by a further increase in prosecutions under the Act, the number being 665 against 599 in 1910 and 455 in 1909.

The increase occurred mainly in the Court of the Sub-Magistrate of Vayitri, where a rise of 81 in the number of cases filed under section 30 was only partially counterbalanced by a decrease of 33 cases under Section 24. Most of the tea estates of the Wynaad are situated in the jurisdiction of this Sub-Magistrate, and the increasing use made of the Act is, no doubt, due in part to extensions of tea and a larger labour population. But I am inclined to think that the real explanation of the increase is to be found in the altered conditions of the planting industry. In the last few years the private estate has practically gone out, and now the majority of the tea estates in South Wynaad belong to two big companies. The estates in consequence are run on strictly business lines; they are inspected periodically by visiting agents; Soperintendents who do not give satisfaction are got rid of; and naturally therefore they are apt to make much use of the Act not so much with the object of getting their maistries and labourers punished as to put pressure on them to complete their contracts under section 33. The increase in the number of cases filed before the Sheristadar-

Magistrate is due to the opening of new estates in the neighbourhood of Manantoddy.

"Prosecutions were insrituted by 26 estates, against 31 last year. . . .

"For the last three years a large number of cases have come from Achoor, Touramala and Cootacoil, but I have no reason to suppose that any connection is to be traced between the treatment of the labourers on these estates and the number of prosecutions which the Superintendents find it necessary to institute. . . .

"The Act continued to work fairly well on the whole, and so far as I can judge, the chief complaint of the planters is in respect of the non-execution of warrants. There is no doubt that there is considerable justification for these complaints, as the following statistics indicate. They show the number of warrants issued by the Sub-Magistrate of Vayitri between the 1st January 1906 and the 1st July 1911, which still remain unexecuted:—

ISSUED BY—

(*a.*)	The Wynaad police	79
(*b.*)	The police of other Malabar taluks ...	147
(*c.*)	The Mysore police	82
(*d.*)	The police of British districts other than Malabar	278
	Total ...	586

"The figures are unsatisfactory, and I have been enquiring into the reasons why so many warrants remain unexecuted. The difficulties of execution of course are obvious, and I fear that they will never be wholly overcome. In a certain percentage of cases, the execution of the warrant is not possible, as when the name and address of the cooly who is supposed to have entered into the contract are false or when the cooly has emigrated or left his village (possibly under an assumed name) for service on another estate or in another planting distirct. But so far as I can see avoidable failures to execute warrants must be due to one or both of two causes—

either (*a*) the particulars given in the warrants as regards the person to be arrested are insufficient to give the police a fair chance of executing the warrants;

or (*b*) the police are, as the planters say, slack and indifferent in executing warrants.

"As regards (*a*) there should be no difficulty provided that Magistrates and others empowered to attest contracts are careful to satisfy themselves that all the particulars required by the Act and the rules under the Act are entered in the contracts and that Magistrates issuing these warrants see that the warrants are properly prepared. Indifference on the part of the police, if it exists, will not, in my opinion, be cured by the additional register suggested at the last meeting of the United Planters' Association, Southern India. It can be checked only by vigilance on the part of Sub-Inspectors and Inspecting officers generally. The Deputy Inspector-General of Police, Southern Range, however, is now enquiring into the whole matter. His report will presumably reach Government in due course, and it may be that he will be able to suggest remedial measures. Pending the result of his enquiry I am not taking any action in the matter.

"As the result of the increasing number of labour cases filed year after year, it is probable that some re-arrangement will be necessary of the division of the Wynaad Amsams between the Tahsildar and the Deputy Tahsildar with the object of giving relief to the latter. I am enquiring into this point."

Scientific Officer's Papers.

XCIX.—THE RELATION OF SOIL BACTERIA TO HUMUS AND LIME IN THE SOIL.

All cultivated soils contain large numbers of bacteria and some species are so common as to constitute a definite bacterial flora. This flora varies with climatic conditions, the composition of the soil, and methods of tillage and cropping just as the more familiar surface flora varies with these conditions.

The well-being of more highly organised plants and animals, including man himself, depends upon these soil bacteria to a very great extent. They are the "connecting link between the world of the living and the world of the dead: the great scavengers entrusted with restoring to circulation the Carbon, Nitrogen, Hydrogen, Sulphur, and other elements held fast in the dead bodies of plants and animals. Without them dead bodies would accumulate and the kingdom of the living would be replaced by the kingdom of the dead."

Soil bacteria, however, are not merely destructive agents, for some species of them are able to do constructive work and their existence is indispensible.

Different types of soil contain very different numbers of bacteria; dry sandy soils may contain only a few thousands per gramme while rich agricultural loams may contain countless hosts amounting to twenty million per gramme and more. Periods of rainfall are followed by large increases in the number of bacteria in the soil while periods of drought decrease their numbers. Free circulation of air also has a marked effect upon them, sandy soils favouring the development of aerobic species, that is bacteria which must have oxygen for their existence, while clays favour the development of anaerobic species, those which cannot live in the presence of much oxygen. Consequently methods of tillage have a great influence on the numbers and kinds of bacteria in the soil. Mechanical operations like digging which affect the evaporation of moisture from the soil and the aeration of it increase the numbers of bacteria. The addition of manures and fertilisers also profoundly affect the soil bacteria, especially materials like Cattle manure and Composts which are themselves rich in bacteria. The addition of a ton or two of such manures introduces into the soil many millions of bacteria and not only adds thus to the number already present there, but also influences the rate of their subsequent increase. Organic manures like Poonac and green manures do not add large numbers of fresh bacteria to the soil but merely supply a store of food for those already present.

The humus in the soil is the seat of all the most important bacteriological activities; it not only provides food for the bacteria but it favours their rapid development by providing suitable moisture and temperature conditions. This humus is largely supplied to the surface soil on Coffee estates by the natural mulch, as was pointed out in Sc. O. Paper No. 97 where it was shown that it supplies a large amount of Nitrogen each year. The Nitrogen compounds in the natural mulch and the humus are, however, complex bodies and not immediately available to the Coffee. Before they become availahle they must be broken up and changed into simple substances like ammonia, nitrites, and nitrates. This is accomplished by the soil bacteria and hence their great importance. They may accomplish this work economically or wastefully depending upon the soil and the climate, but by proper methods of cultivation and manuring their action can be largely controlled.

Plants like Coffee take most of their Nitrogen from the soil in the form of nitrates dissolved in the soil moisture, and these nitrates are very simple chemical compounds as compared with the humus from which they are drawn. The change of humus nitrogen into nitrates cannot be brought about by one single kind of bacteria ; in fact there are known to be at least three well defined steps in the process, each brought about by separate kinds of bacteria. The first step in the transformation results in the production of ammonia. This ammonia is acted upon by a second jât of bacteria and changed into nitrites, and the third and final stage is brought about by a third jât which converts the nitrites into the nitrates which are then available to plants.

The class of bacteria which produce these changes in the humus are called nitrifying bacteria, and for their proper development they must have sufficient moisture, a good supply of humus, and most important of all they will not develop in the absence of Lime or Magnesia which serve to neutralise the nitric acid actually produced by the bacteria. The presence of Lime and other bases, as they are called, is of extreme importance. They combine with the nitric acid produced by the bacterial activity and in doing so form nitrates of lime, magnesia, and potash, substances which are not injurious to the soil bacteria even when present in considerable quantities. In the absence of a base like Lime the nitric acid accumulates and reacts injuriously on the bacteria, and small amounts of this acid are sufficient to seriously retard the nitrification processes in the soil.

Thus there is an intimate relation between the amount of Lime and the nitrifying power of any given soil. In soils to which large amounts of organic materials have been added there is a continuous production of nitrate of lime which is either taken up by the crop growing on it or is removed by drainage. Consequently there is a steady drain on the natural lime content of such a soil and if this is originally small the time may come when it becomes absolutely necessary to apply more lime to it to prevent it becoming sour and to ensure the continuance of nitrification. Soils yielding large amounts of nitrate, that is those rich in humus, lose their lime in other ways also. Bacteria produce Carbon dioxide as a waste product and this dissolved in the soil water attacks the Lime and forms bicarbonate of lime which is soluble in the soil water and is continually carried away in the drains. It becomes necessary, therefore, on practically all but limestone soils, to apply lime from time to time, lest the soil become sour and the nitrification processes feeble.

RUDOLPH D. ANSTEAD,
Planting Expert.

JAVA TEA AND COFFEE.

According to the *London and China Telegraph*, the Java tea production figures for 1911 are expected to show a large increase on 1910. It is interesting to note the tremendous expansion in this cultivation, which from 3,800,000 kilos (kilo=2·2 pounds) in 1890 rose to 7,000,000 in 1900, and to 18,500,000 kilos in 1910. The Government's coffee cultivation in Java, however, has been in a very backward state of development during the past year, only a total area of 72,223 bouws (bouw=1¾ acres) having been planted with 92,900,000 coffee trees, as contrasted with 82,929 bouws and 106,200,000 trees in 1910. There was thus a marked decline of 10,706 bouws and 13,300,000 trees.

COFFEE.

Coffee Culture in North Queensland as it was and is.

Mr. Howard Newport, Instructor in Tropical Agriculture, has contributed the following paper to the *Queensland Agricultural Journal* :—

The prospects of coffee culture in the tropical parts of Australia, especially Queensland, have materially improved during the past few years. This does not mean that they were really bad at any time ; for the conditions of climate and soil have not changed, and are, as they were. in advance of those in nearly every country where coffee is being commercially cultivated. The history of this staple in Queensland shows no exemption from the vicissitudes incidental, and which precedent indicates as unavoidable, to the introduction of an industry to a new country and to conditions that involve some change of method or system from that in general use elsewhere and, therefore, considered orthodox.

In North Queensland, fifteen to twenty years ago, there was what may be called a boom in coffee—it was a very mild boom ; but public opinion looked upon it particularly favourably at the time, and having no precedent to go by, hoped great things of coffee culture.

As a matter of fact, the coffee planted in Queensland *did* do well, and amply proved its suitability, with due adaptation, as an industry for the white-people tropics. In the absence, however, of professional guidance by authorities sufficiently thoroughly acquainted with the natural and life history of the plant to appreciate the bearing on its cultivation the conditions of the new country imposed, initial mistakes were made that, owing to the permanent nature of the product, were irremediable in many individual instances. Several fairly large plantations were opened—too large for the available labour supply; and numerous small plantings of 100 or 200 trees were made—too small to receive proper attention. Hill sides, steep slopes, and high elevations were chosen because books said such localities were essential—in some other country—but which only served to increase the cost of production here, where (unlike most other countries) all the conditions necessary for successful cultivation may be found at sea level and on comparatively flat land. The picking of the crop was not understood either, and was found irksome, because totally different to any kind of harvesting previously undertaken. Finally, the prices fell considerably, and droughts, floods. frost, and ticks drove many settlers temporarily away from their selections, where the little coffee patch, though it, in most instances, throve and survived these troubles, yet was not of sufficient extent to solely support the settler and his family—and public opinion no longer looked favourably upon it. With the swing of the pendulum coffee-growing became unpopular, not because of any unsuitability of the staple to the country, but because of just such force of circumstances that every industry must meet with periodically. Had the country been more populated or had the industry been more established, no doubt these difficulties would have been easily met and satisfactorily overcome, as industrial troubles have been, are being, and ever will be.

Precedent also shows that rises and depressions must and do occur and recur in cycle-like courses, and that, as the metaphorical pendulum swings beyond the normal on one side, so is it inevitable that it shall return. This is now the case with coffee culture iu tropical Queensland.

In discussing the industries possible of establishment in this country, coffee has been quoted as one that has been tried and found unsuitable, or, at any rate, has not been hitherto established to any appreciable extent. One or two abandoned plantations have been cited, and what this or that pioneer in the industry has lost has been quoted; and it is implied that, therefore, coffee culture has not now, and never will have, any prospects of being successfully undertaken here. Those that argue on these lines, however, seldom state the whole facts. They are apt to forget to mention that there are any plantations at all that, having avoided (be it by chance or wisdom) the errors of others, have not merely survived, but are doing well, and paying well. They omit to draw any attention to the reasons (generally obvious to those who know) of want of success in any particular instance, and it does not at the time occur to them to mention the small but eloquent fact that the price of the raw article was but little more than half what it is now when cultivation of an abandoned plantation was stopped; also, that, in by far the majority of cases, growers discontinued the cultivation of their coffee for totally different reasons than those of price, labour, or amount of crop returns; but that when they had to go, the popularity of the staple having waned, no one was apparently prepared to go on where they left off, even though shown to be payable, and the cultivation of what was considered a "fancy" product simply lapsed.

At the time of the decline in popularity of coffee in Queensland I have stated that prices fell. This was largely (though not entirely) due to Brazilian over-production at the time, and was not, therefore, confined to Queensland. Raw coffee in Queensland reached its minimum at a value of about 4½d. per lb. in the parchment. The pendulum in this matter is now slowly but surely swinging, and prices of coffee all over the world are gradually rising. The present price in North Queensland for parchment coffee is 7½*d.* to 8*s.* per lb. Another point omitted is the statement frequently made to me by growers who have a lttle coffee, to the effect that now they wish they had more; and by a number of those who had small plantations saying that, if only they could start again *now* with the knowledge and experience they have, how perfectly confident they are of the success they could make of it.

It might be asked where these plantations are that have been referred to as having successfully survived this period of depression and to be now paying so well, and how is it that we hear nothing of them? They exist at Mount Buderim, Mackay (Mount Jukes), Atherton, Kuranda, and are, many of them, giving returns of from 8 to 10 cwt. per acre as an average, and up to 20 cwt. in specially good seasons. Reference to the agricultural statistics as appearing in the last annual report of the Department of Agriculture and Stock (1911) will show that the average returns for the two districts of Mackay and Herberton were 2,304 lbs. and 1,046 lbs. respectively, per acre: and everyone knows that a district average must include at least a percentage of indifferently worked, as well as the properly worked, plantations. Unfortunately for the country, very little is heard of these successful plantations—not half as much as of the failures. Most of these growers are manufacturing their own coffee and find a ready *local* sale for it, and that within a radius of a few miles only. Their product, therefore, is seldom shipped south to the big markets of the Commonwealth—often not shipped at all, and, while there is an absolute consumption of every iota produced. the amount is insufficient to materially affect the market. Hence Melbourne and Sydney and the South generally know little and hear less of what coffee is being produced.

This is, I think, sufficient to indicate that as times have advanced conditions have changed, and, as far as coffee culture is concerned, have improved with the advancement, and that public opinion is recognising this and has good reasons for doing so.

The want of success in individual instances years ago cannot rightly be taken as any criterion on which to base an assumption that coffee culture is not now worthy of attention. As a matter of fact, if we accept the simile of the pendulum, which is amply corroborated, a period of prosperity for the industry, more or less commensurate with the depression now past, is commencing.

The main points of difference between coffee culture as a business proposition fifteen years ago and now are—increased settlement of the country; greater facilities of transport; improvement of prices; a spirit of more open-mindedness, though perhaps of greater caution (and, therefore, more business-like and sound), towards the subject; and a fuller knowledge of the requirements of the staple in this country obtained from the experience of the earlier growers.

I would submit that all these are important factors; but, as the increase in the price of the raw article will probably appeal most strongly, from this point of view if no other, the subject is worthy of renewed attention and close study, both as a business investment and a means of increasing settlement.

Let us, therefore, shortly consider the culture of coffee under present-day conditions as a business proposition.

Coffee Culture as a Business Proposition.

It must be admitted that the policy of the country more especially encourages the individual settler producing for himself and by himself. This being so, the large estates and plantations commonly existing in (usually black labour) countries where coffee is grown are not adapted to Queensland, and the plantations must be limited in area practically to what one settler can manage. Let the area then be limited, for the purpose of this paper, to, say, 15 acres.

The cost of the opening may be put down at—Land, £5 per acre (outright purchase); felling, £2; clearing, £2; plants, £1; planting, £2: total, £12 per acre; and for 15 acres £180: buildings and machinery necessary for a plantation of this size, £250. Add to the capital the cost of upkeep, until in bearing, one man's wages at 8s. a day for three years, £375, involving a total investment of a capital of £805. This is an outside estimate in that new scrub land is allowed for, and outright purchase instead of selected Government land and long terms. The capital investment necessary may be very materially reduced by an individual worker in many ways, as, for instance, taking up some of the already cleared and stumped banana land (perfectly suitable for coffee), which would not only probably cost less, but save several pounds per acre in felling and clearing; and by possibly not drawing to the full extent on the 8s. a day set aside as cost of living, inasmuch as a great deal might be produced on the farm to reduce this cost, and in growing catch crops, such as bananas or vegetables, between the coffee during the initial period of waiting: also, the interest accruing on £150 of the £250 set aside for buildings (which would not be required until the estate came iuto bearing) would be of some assistance during the first three years.

In the matter of returns the first and possibly second crops would but cover expenses. Once in full bearing and properly opened, an average crop of 10 cwt. per acre may be safely anticipated. With this, as with other staples, its successful production depends very largely on the cost of harvesting; 1*d*. per lb. is admitted generally as a fair price to pay for the picking of coffee berries. Indeed, it is a high price when it is considered that this amounts to more than half and almost two-thirds of its value; but it were better to overstate than understate this unavoibable item in the production. One penny per lb. means that a man labourer must pick 96 lbs. per day to make wages—say, 100 lbs.; but the work requires no special strength or effort, and is therefore suitable for youths, boys, and girls, who can often earn comparatively high wages. I have already mentioned the record of a boy picking 190 lbs. in a day. Ripe coffee berries (or cherry) produce one-fifth to one-fourth of their weight in dry marketable produce called "parchment." Let us take the lesser figures, and so leave a still broader margin. A return of 10 cwt. (parchment) per acre would, therefore, involve a cost of harvesting for the whole plantation of not more than £350, and to this must be added the cost of annual upkeep of £125, making a total of £475. The 7½ tons at, say, 7½*d*. per lb., would be worth £525, to which must be added the Federal Government bonus of 1*d*. per lb. of clean coffee, equal to £7 per ton in parchment, amounting to £52 15*s*., making a total gross annual return of £577 15*s*., and net returns of £102 15*s*.

This, it may be said, discloses no fortune—it does not, but it must be borne in mind that minimum averages rather than maximum returns have been taken, and also that allowance for the living of the grower at 8*s*. a day has already been made and the £100 odd means therefore ***profit***, and represents a rate of interest on the greatest amount of capital invested of some 12 per cent.

There is no reason why the area under cultivation should not be increased beyond the 15 acres suggested according to the capacity of the settler, more especially if the coffee be grown under shade, reducing the amount of pruning, weeding, and field attention necessary.

The larger the area the greater the rate of profit, as the cost of the buildings and plant need not increase: but the obtaining of sufficient labour for harvesting would become a matter of some moment if the area were very materially increased.

The harvesting of a 10-cwt. crop spread over four months would require just over one hand for every 2 acres; so a 10-acre plot, although the total returns are not so large, can often be harvested by the grower's own family.

To newcomers to the colony with small capital, with or without a family (but especially to the family man), the cultivation of coffee in North Queensland offers excellent investment and prospects of an independent and healthful life in the production of a commodity the market for which is rising as well as increasing locally—a plantation of which, sufficient to return an income of £4 per week, need not exceed an area that the owner can himself manage (with the exception of the harvesting only), and which, once established, requires no replanting, remaining a source of income for the rest of his life.

Present Salvador Coffee Crop.

The present crop of coffee of Salvador, which previously had been estimated at 700,000 quintals, is not turning out as well as had been expected, according to a report from San Salvador, and probably will not reach more than 600,000 quintals.

RUBBER.

Production of the German Colonial Possessions.

According to the official report on the German Colonial Possessions for the year ending with April, 1911, the period under review had been in general favourable to their development. This was largely due to the construction of new railways, while scarcity of labour proved a difficulty at various points, especially in the more closely planted districts of East Africa.

In view of a recent noticeable reduction in the interest previously taken by German and English capitalists in German colonial investments, the Imperial and colonial administrations have been jointly investigating how the abuses which have occnrred in connection with certain new incorporations could be prevented in the future.

Under the influence of the high prices current in the earlier part of the official year 1910-11, German colonial rubber exports display a marked increase in comparison with those of the preceding annual period, as will be seen by the following figures:—

EXPORTS FOR YEARS ENDING APRIL, 1910 AND 1911.

		1910.	1911.
Kamerun	tons	1,517'635	1,961'756
German East Africa	„	474'348	743'706
Togo	„	136'785	134'919
German New Guinea	„	6'616	8'649
Total from German possessions...	„	2,135'384	2,849'030

KAMERUN.

Kamerun took first place, nearly the entire quantity from that source in 1911 going to Germany, 1,747'540 tons; England taking 195'900 tons, and other countries the balance, 18'320 tons.

Rubber formed in value more than one-half of the 4¾ million dollars' aggregate of Kamerun exports for the year 1910 1911. The total number of rubber trees in Kamerun at the end of April, 1911, was 5,744,248 divided as follows:—

Kickxia	trees	4,915.865
Hevea	„	786,270
Manihot	„	19,343
Ficus	„	16,686
Castilloa	„	2.584
Sundry varieties	„	3,500
Total ...	„	5,744,248

It is stated, however, that the yields from *Kickxia* have not been encouraging, and that while its cultivation has been materially reduced as compared with former years, that of *Hevea* has recently made great progress, planters finding advantage in such a course. *Hevea brasiliensis* gives a larger yield, is less exacting than *Kickxia* as to soil. and is very suitable for intermediate planting with cocoa, this combined plan of cultivation now being more or less generally carried out. Owing to the necessary quantity of Kamerun seed not being available until 1912-1913, most of the young plants have at present to be imported from India. When this necessity no longer exists, a considerable extension of Kamerun planting is anticipated.

GERMAN EAST AFRICA.

The following results are shown for the year 1910-1911 :—

		Exports to Germany.	Exports to other countries.	Total.
Plantation rubber ...	tons	359'85	54'04	413'89
Wild rubber ...	„	268'37	61'45	329'82
Total ...	tons	628'22	115'49	743'71

In rubber cultivation *Ceará* seems to have assumed the first place, hitherto occupied by *Manihot.*

A purifying establishment for crude rubber is being operated at Muheja and is said to be well occupied, while another is being installed at Tanga. In many cases the crude product is rolled and at the same time washed on the plantations.

TOGO.

The whole of the exports of rubber went to Germany and were about the same in quantity as during the preceding year.

GERMAN NEW GUINEA.

The surface under cultivation with rubber in New Guinea in April, 1911, was 6,040 acres, distributed as follows among different varieties:—

Ficus	acres	4,237
Hevea	„	1,150
Castilloa	„	640
Manihot, etc.	„	13
Total ...	„	6,040

While these figures only deal with the year ending April 30, 1911, they are indicative of the present tendency of rubber cultivation in the German colonial possessions.—*India-Rubber World.*

Growth of Rubber in Papua.

Mr. A. S. Bloomfield writes us from Melbourne under date 22nd February, stating that he has just returned from a trip to New Guinea and enclosing some photographs obtained there. He is convinced . . . that the Pará rubber tree will grow in New Guinea as well as, if not better, than in any other country in the Tropics. The tree (Fig. 2—) with the native standing by it is three years and one month old and has a girth at 3 feet from the ground of 24 inches.

The other photograph (Fig 1) represents part of a small clearing of three years and six months old rubber which has not had the best of treatment with regard to weeding, yet compares very favourably with trees of a similar age in other countries. . . .

Photograph No. 3 represents a tree two years and seven months old on the property of the Galley Reach Rubber Estates, Ltd. . . .

One thousand acres have been planted by the two companies in this locality and excellent facilities as regards transit are afforded owing to the fact that they are situated only 40 miles from Port Moresby (the capital of British New Guinea and produce can be taken from the plantations themselves by water to Port Moresby Wharf. On the Galley Reach Estate lines some 9 feet wide have been cleared down the line of trees and the intervening spaces between the next line of trees have been planted with sweet potatoes and passiflora which keeps down the lalang grass.

Mr. Bloomfield . . . thinks that some . . . readers may be . . . glad to see what growth and general appearance of estates in Papua amounts to.—*India-Rubber Journal.*

The Progress of the New York Rubber Exposition.

AN INTERVIEW WITH MR. A. STAINES MANDERS.

Mr. Manders has returned from New York more than satisfied with the progress that has been made with regard to the forthcoming Exhibition, and speaks enthusiastically of the kind way in which he has been treated by the merchants, manufacturers, and pressmen of the United States. With reference to the part that is being taken by the British rubber-producing colonies, Mr. Manders said :—

"All the Mid-East Governments will, I believe, be represented, Malaya is making a fine show. Mr. Leonard Wray, I.S.O., the Commissioner for Malaya, is preparing a particularly interesting exhibit. The design for their stand which I have had prepared is not yet passed. It represents the typical Malay style of building in bamboos, with a continuation in the classic Southern Asia manner. The Ceylon stand, the design for which has been accepted, is very handsome, and is founded on the Hindoo temple style, with an entrance typically Singhalese. Lower Burma is making a good display, and although I have not yet heard from the Southern Indian authorities, I hope and believe they will exhibit."

"With regard to Foreign countries?"

"The largest and handsomest stand will be that of Brazil. Peru is also making a fine exhibit. The rubber-producing colonies of the Continental countries including the Portuguese colonies and French Indo-China, will be represented. The Dutch East Indies, however, have not yet come in, but Dutch Guiana is exhibiting. The Philippines are showing."

"How will the machinery section be represented?"

"This section will be very fine. Five of the largest machinery manufacturers of the States are showing their rubber machinery at work. Crude rubber will be washed, rolled, and dried on the spot, so that the value of the machinery can be accurately gauged by users. British machine makers, I am sorry to say, are not showing, which is regrettable, as delegates from all the ruhber-producing republics of South America will be present, and I fear that trade will be lost to British exporters." . . .

"With regard to the receipt of exhibits?"

"I hope that all exhibits will be at the Exhibition Hall by September 12. The exhibition building has been constituted a bonded warehouse, and exhibits, as they arrive, will go straight there. This avoids unnecessary handling and waste of time. All exhibits come in duty free. Governments exhibiting will also be allowed to bring in printed matter free of duty. But private exhibitors will have to pay the 25 per cent. duty on their pamphlets, leaflets, &c. Visitors will, I am sure, be delighted with the great conveniences that will be at their service. Good restaurants and excellent postal and cable and telephone services will be at hand. A club for delegates has been established, and there will be a conference, over which Mr. Pearson will preside. . . .

Mr. Manders believes that the Exhibition will give an immense impetus to the rubber industry in all its branches, and congratulates himself upon the rapid progress that has been made, considering that the organisation only started in October last. He promises many novelties, the nature of which he does not, of course, desire to disclose. Very interesting souvenirs are being prepared for the Press lunches and banquets and other entertainments. Referring to the American Press, Mr. Manders says that both the popular and scientific Press have done all in their power to assist him, and to help to make the Exhibition the success which it unquestionably will be. —*The Rubber World.*

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The Annual Meeting, 1912.

Though the opening day of the next Annual Meeting has not yet been settled, the 19th August, 1912, has been suggested by the Chairman and may be regarded as, at least, the approximate date.

The Planters' Association of Ceylon.

Mr. John Still has been elected Secretary. The *Ceylon Observer* remarks:—" Mr. John Still, who has been appointed Secretary of the P. A., is a young, but worthy successor to the late Mr. Alexander Wardrop and can be expected to fully maintain the high standard of secretarial efficiency set by the late Mr. Alexander Philip and maintained by Mr. Wardrop. As Assistant Labour Commissioner and later Secretary of the Ceylon Proprietors' Labour Federation the new Secretary will start with a good grip of the labour problem, while his connection with the Land Settlement Department should help the Association to take a strong line when necessary upon this important subject. His first experience in Ceylon was as a planter in Dikoya; and he has also been Assistant to the Archæological Commissioner, Mr. H. C. P. Bell."

At a meeting of the Committee on the 10th instant it was moved from the Chair and unanimously resolved—all members present standing:—" That the Committee of the Planters' Association do record their sense of the grievous loss which they, and the Planting Community generally, have sustained by the death of Mr. Alexander Wardrop, Secretary of the Planters' Association and Honorary Secretary of the Planters' Benevolent Fund, and their sincere sympathy with his relations."

At a recent Committee meeting it was resolved:—"That a sum of Rs.1,000 be put aside annually as an honorarium to the Chairman, Planters' Association, in view of the large amount of travelling he is called upon to do."

At a meeting of the "Thirty Committee" of the Association it was resolved:—"That Rs.1,000 be voted from the 'Thirty Committee' funds to cover the cost of a Tea Exhibit at the New York Exhibition."

The Ceylon Association in London.

Mr. James Loudoun Shand has accepted nomination as President of the above Association.

Volume VI/2.

After excessive delay, this volume is now ready, and can be had at the price of Rs.2 per copy per V. V. P. (postage in India and Ceylon included).

Notes and Comments by the Scientific Officer.

157. *Coagulation of Hevea Latex by Carbonic Acid.*—The lecture on this subject by Dr. Wilhelm Pahl reproduced from the *India Rubber World* in Vol. VII, No. 11, of the *Planters' Chronicle* has brought the following interesting letter and inclosure from Mr. Basil H. L. Hankey:

"The article published by you a few numbers back, concerning the coagulation of rubber by Carbonic Acid, was so interesting to Rubber Growers, that I sent it to the Rubber Growers' Association in London and asked their Chemist to report on it. I have received the enclosed reply, which may interest you. If you consider the article worth making public, I don't think the Rubber Growers would object to their letter being published."

[*Inclosure*]

Copy of a letter, dated April 26, 1912, from the Secretary of the Rubber Growers' Association, London, to Mr. Basil H. Hankey.

"Our consulting Chemists write as follows concerning the matter on which you wrote on the 21st current:—

"The printed account which you enclose bearing reference to Mr. Wilhelm Pahl's patents upon the subject is practically the same as the paper read by him last year at the International Rubber Exhibition. We were present at the time and put many questions to Mr. Pahl, and as far as the information which we could get at the time went, there was absolutely no experimental evidence in support of the very strong views which he expressed on behalf of his process, which received rather severe criticism from many sources. In addition, we had the opportunity of seeing a plan of the plant which he proposes to use for operating his process on a large scale. The plant was not exhibited, no samples of rubber treated by his process were forthcoming, and we had nothing to go upon at the time beyond the statements made by the inventor who is evidently extremely sanguine as to his method. Since then we have applied to Germany for further information upon the subject and also for samples. Now that the process appears to be fully covered by letters patent in different countries we will again apply to the inventor for samples of the product which we will thoroughly test and see whether it has the superior qualities claimed for it, and we will get to know whether we can make arrangements for testing his process in the East. If the samples of rubber are forthcoming we will make the necessary tests and report to you in due course. We quite agree that steps should be taken to ascertain whether there is anything in this process."

Upon referring to the original account of Dr. Pahl's paper and the discussion which followed it in the *Official Report of the Proceedings of the International Rubber Congress* held in 1911 it is seen that his proposed method was very severely criticised by many of the members and all complained of the lack of practical evidence and figures to back up his statements. No one appeared to agree that Carbonic Acid could be the controlling factor in coagulation of hard Pará, and Dr. Sandmann brought the following powerful argument forward to show that it was not:—

"In order to produce as much carbonic acid as possible a complete combustion of the material must take place. A smouldering fire, making thick smoke, only produces comparatively little carbonic acid. The *seringuero*, however, avoids, so far as possible, a bright fire. What he desires is a strong, steamy smoke, and he interrupts the smoking of the latex whenever a bright flame appears. His practice, therefore, precludes the production of much carbonic acid, which, Dr. Pahl believes, produces the principal effect. Without troubling himself about the chemistry of the process, the *seringuero* on purely empirical grounds, works in such a way as to produce in the smoke only dry distillation products—from his Urikuri nuts, Massaranduba wood, or whatever it be, products such as creosote, carbon monoxide, acetic acid, etc., which act not only as coagulants but as preservatives. The latex, being treated in thin layers, is permeated through and through by these distillation products in gas form, and is thus completely sterilized. The coagulation is brought about partly by the acid constituents of the smoke, and partly by the heat of the smoke, a factor which should not be underrated in studying the coagulation process. Not only does it hasten coagulation : it also causes strong contraction of the rubber globules. The *seringuero*, therefore, does not begin smoking latex until the smoke emerges from the *borao* at the right temperature.

" The high esteem in which *Hevea* rubber from the Amazon territory is held by manufacturers is due, in my opinion, to the fact that this rubber has been thoroughly sterilized by the smoke, and that the coagulation has been effected partly by acid, and has been rendered rapid by the heat, a most important point. Another factor in this high valuation is the fact that this rubber has been obtained from trees which are 15 to 20 or more years old. The method of tapping. *i.e.*, by means of the *machadinho*, does not permit the tapping of younger trees. On the other hand. the trees which at present yield the plantation rubber comprise a large number which are perhaps 8 years old, but the majority of them are only 5 to 6 years old.

" When plantation rubber is obtained from trees 15 and 20 years old without being intermixed with latex from younger trees ; when it is acknowledged that sterilization of the latex and quick coagulation are the indispensable conditions for producing good rubber ; and when the treatment of the latex is carried out on these principles the produce of the plantation will be as good as that from the forests of Brazil."

As the Rubber Growers' Association Consulting Chemists say, " steps should be taken to ascertain whether there is anything in this process," and I am glad that Mr. Hankey has taken the matter up. At the Rubber Congress Dr. Stevens said, " personally I cannot see why carbonic acid should yield a better rubber, I do not see any theoretical reason, still we are anxious to try every kind of coagulant. We have tried a large number but we are always ready to try fresh ones if they are brought along and I think, therefore, that we should certainly give this one a trial too." This is exactly my feeling, and I hope that it may express the opinion of the Rubber Planters of South India, and I would appeal to one of the Rubber Planters' Associations to take the matter up and make the trial. Personally I am much obliged to Mr. Hankey for the information he has so kindly sent for publication.

158. *New Coagulant for Ceará Latex.*—According to the *Experiment Station Record* for February, A. Zimmermann, during the course of some experiments. conducted at Amani, found that the addition of a one per cent. solution of Calcium Chloride to the latex of Ceará resulted in a fairly good coagulation. A one and a half per cent. solution of Calcium Chloride is considered sufficient to bring about complete coagulation at the end of the rainy period when the latex is especially fluid. The use of Calcium Chloride reduces the cost of the coagulent considerably without injuring the elasticity and nerve of the rubber. Barium chloride, Magnesium chloride, and Magnesium sulphate all proved to be rather strong coagulants but were not so active as Calcium chloride.

RUDOLPH D. ANSTEAD, *Planting Expert.*

DISTRICT PLANTERS' ASSOCIATIONS.

Wynaad Planters' Association.

Proceedings of a General Meeting held at Meppadi Club on May 15th, 1912.

PRESENT.—Messrs. Bowness, Darkin, Egan, Gillatt, J. Carson Parker, Powell; Honorary Member, Mr. Mullaly, D. S. P.; *and Visitor,* Mr. Cammiade, Divisional Officer, Wynaad; and C. E. Abbott, Honorary Secretary.

Mr. J. Carson Parker in the Chair.

1767. *The Proceedings of last Meeting* were confirmed.

1768. *The late Mr. Atzenwiler.*—It was unanimously resolved: "That the Honorary Secretary write to Mr. Atzenwiler's brother to express our regret at the loss of one of our oldest members, and our sympathy with him."

1769. *Non-Execution of Warrants.*—This subject was discussed in connection with the Departmental Enquiry recently held by the Deputy Inspector General of Police (see para. 1765 March Proceedings). The following resolution was passed unanimously: "That the suggestion of Mr. Mullaly to the effect that Planters should in all doubtful cases request the Superintendent of Police for the District in which the Maistry to whom an advance is proposed to be made lives, to make enquiries as to the Maistry's standing and means, and report the same to the planter, is an excellent one and be gratefully accepted. And that the suggestion be communicated to the Deputy Inspector General, Southern Circle, in the hope that he can see his way to give orders to all Superintendents of Police to give effect to the suggestion, which it is believed would do away very largely wtth the question of non-execution of warrants."

1770. *Westward Ho Bungalow.*—It was explained that this Meeting had been called at an earlier date than usual, in order if possible to get the question of selling this bungalow settled. It was proposed by Mr. Bownass seconded by Mr. Gillatt, and carried—" That this Association is willing to sell the Westward Ho bungalow to the Panora Company." After some discussion the following resolution was proposed from the Chair and carried —"That this Association sell the Westward Ho bungalow for Rs.2,800; this figure representing their opinion of the value of the bungalow."

1771. *Denudation of the Tamracherry Ghaut.*—The Honorary Secretary stated that a member had suggested to him that the removal of timber had gone so far as to become a danger to the road. It was resolved to address the Collector of Malabar.

1772. *District Board Membership.*—Read letter from President, District Board, asking the Association to nominate a Member to succeed Mr. Malcolm, whose term of service had expired. The meeting resolved to nominate Mr. J. Carson Parker, and thanked Mr. Malcolm for his services.

1773. *U. P. A. S. I. Annual Meeting.*—Resolved that Mr. Waddington be asked to represent this Association. Rs.150 was voted for his expenses.

1774. *Rules.*—It was resolved that the rules of the Association be revised and that the following Committee be appointed to suggest alterations and to report to the November Meeting:—Messrs. Parker, Malcolm, Abbott, Powell, and Waddington. Other members who have any alterations to suggest are asked to write to the Committee, as it is desirable to arrive at a final settlement.

1775. The Chairman proposed a vote of thanks to Mr. Cammiade and Mr. Mullaly for attending the Meeting, and for the assistance promised.

A vote of thanks to the Chair terminated the Proceedings.

(Signed) J. CARSON PARKER, *Chairman.*
(„) C. E. ABBOTT, *Hony. Secretary.*

Note.—It was decided that no Meeting be held in June unless it is necessary for some special purpose.

North Mysore Planters' Association.

Proceeding of the Quarterly General Meeting held at the Mallarsengooda Bungalow on May 15th, 1912.

PRESENT.—Messrs. T. Hunt, (President), C. P. Reed, E. C. Kent, E. W. Fowke, and W. H. Reed (Honorary Secretary). *By Proxy*:—Messrs. C. Danvers E. Lund, H. G. Bonner, E. C. Bolton, F. Morgan and L. P. Kent.

Alteration of Financial Year.—Resolved that the financial year in future be from the 1st July to 30th June, and that Rules 4, 5, 10. and 20 be altered accordingly. Rule 3 be altered to meet the increased subscription as passed at annual General Meeting 20th March 1911. Addition to Rule 9 '5 members to form a quorum.'

Council of Mysore Planters' Associations.—This Association is unanimously against Rule 6 as framed at preliminary meeting of council and will only agree to voting being on an acreage basis (Example U. P. A. Voting).

Mr. Kent's Coffee Stealing Case.—Mr. Kent read out a detailed statement of his case and has already deposited copies of judgment. It was unanimously decided that the case be taken up by the Association, and the whole of the correspondence, etc., be sent to the Dewan with a request that the matter be gone into.

Europen Deputy Commissioner and Doctor.—Proposed by Mr. E. C. Kent and seconded by Mr. C. P. Reed:—"That the Mysore Government be asked to appoint a European Deputy Commissioner and a European Doctor in Chickmagalur, as promised by them in open Durbar at the time of the Rendition."—Carried unanimously. (217 votes representing eleven members in favour of the above). Further the suggestion was supported by resident native landholders of the Kadur District representing 7,400 acres.

Rearrangement of Subscriptions to the Assistant Scientfic Officer and U.P.A.S.I.—This Association is against the 2 anna basis of subscription to the U. P. A. S. I., as they already literally subscribe as quoted in Mr. Ormerod's letter No. 68/11 of November 28th, 1911. The following amendment was proposed by Mr. Hunt and seconded by Mr. E. W. Fowke:—"That all Associations subscribe at the rate of 1½ annas per acre to the U. P. A. S. I., as on this basis it will give an increase of about Rs.2,000."—Carried unanimously.

Election of Delegates to U. P. A. S. I.—Messrs. C. Danvers and W. H. Reed were elected to represent the Association at the coming U. P. A. S. I. meeting.

The matter of the frequent changes of Amildars in the Mudigere Taluk was brought up for discussion. General complaint was made of the great inconvenience and delay caused. It was resolved that the matter be brought to the notice of the Mysore Government.

(Signed) W. H. REED, *Hony. Secretary.*

CINCHONA.

Mossed and Renewed Bark.

McIvor's theory.

The following are further extracts from *The Agricultural Ledger* referred to in issue of the 11th instant:—

In his note of 1867 "on the propagation and cultivation of the medicinal cinchonas," McIvor gave a detailed description of his mossing system, its aim and working.

His opinion was that quinine and other alkaloids are formed in the leaves of the trees combined with quinic acid and are subsequently deposited in the bark, where with the increase of the cell tissues, an increase of pure quinine would take place. In this cell tissue of the liber, against the constant deposit of alkaloid, a decrease of quinine should take place in consequence of the influence of light and air on the bark. If this oxidation process, so thought McIvor, could be arrested, the quinine formation or increase would steadily continue in the succirubra bark and come up to 17 per cent. The means to prevent this oxidation process was found according to McIvor's statement in the exclusion of light and air by moss covering.

It is necessary to point out that McIvor worked with his theory in front, and a man in such a position tends to see in practice what he expects to see; whereas the better and far safer course is to set the establishment of facts in front, and let the theories follow.

Experiments in Java.

For the accurate estimate of its value and for the completeness of its history, it may be useful to record here what was stated in the meeting of the Koninklijke Academie van Wetenschatken on November 8th, 1878, under the tittle of "Scientific remarks and experiences concerning cinchona cultivation."

The covering of the living cinchona trees with moss.—(McIvor's mossing process). In the report of 1864 it was recorded that "in consequence of the advice given by De Vrij, we have, after the example of McIvor, covered some trees with moss. The moss keeps the trunk in a very damp state, and it is not improbable that to this (and the exclusion of light) may be ascribed the higher percentage of alkaloid observed by Dr Vrij. In a few months comparative tests will indicate the true influence."

These mossing experiments, it must be confessed, "were undertaken with some disinclination if not with prejudice."

In Java, in 1864, hundreds of cinchona plants were covered with moss, and the chemical experts, De Vrij and Moens, had the opportunity of investigating the results. The analyses, however, did not lead to any conclusions. Moens (report 1870) discovered an increase of alkaloids in four plants which had been covered with moss for a year and which had been examined before the operation.

Could this slight increase be ascribed to the moss, or was it the result of the maturing of the plants?

De Vrij examined two specimens of the same age, growing together, one of which was covered with moss. In the moss-covered specimen 1'075 per cent. of alkaloid was found, but without quinine re-action, while in the unmossed bark 0'07 was found with distinct quinine re-action.

Comparing the results obtained by our earlier experiments with mossing, it shows that theories should not be built upon. The experiments in themselves were not sufficient, nor were they carried out with much care (a fact we have mentioned before). This may have been the cause of so many plants dying in consequence of mossing after having been attacked by insects.

On the persuasion of De Vrij, Moens had repeated the experiments on the English method for 3 or 4 years, but with another object. It was said that quinine bark forms vigorously again under moss. Often had we to strip a tree partially of its bark, either for analytical researches, or for the herbarium, or for exhibition. This caused very little damage, as the regrowth of the bark took place every time more or less quickly. If the cambium layer is injured when the bark is being taken off, a speedy and complete recovery cannot be expected; but if the bark is only partly removed there is a chance of quick and complete restoration.

The experiments repeated by Moens appear to prove that the covering with moss certainly facilitates the forming of bark and increases the percentage of quinine. The experiments must succeed the better if they are made on trees which are not too old and stand in well closed gardens. The renewed bark could be peeled off easier and out into strips. Thus Moens is favourably disposed towards the covering with moss; but this statement is not only deemed premature as yet, but I think this method will never come into general practice unless sound proof is furnished that the profits, through the increase of quinine, are considerable. The results obtained from investigation of specimens do not justify the introduction of of any costly method, since the quantity and quality of alkaloid varied so much.

Moens only took into cosideration the cost of mossing, but one must not forget the further cost of removing it.

Fourteen years have now been spent in experimenting on the mossing system with the objects, first to enrich the quinine bark and then to facilitate its renewal, thereby increasing the richness of the quinine; and it is surprising to note that it should be still continued. In British India where the business was being carried out with untiring energy, decisive results should have been obtained, as 14 years is a life-time for a cinchona plant transplanted in foreign soil.

EXPERIENCE IN BENGAL.

" But note what Dr. O. Kuntze says in his 'Monografische Studie nach Beobachtungen in den Anpflanzungen auf Java und in Himalaya,' (Monographical study on observations regarding the plantations in Java and the Himalayas). The experiments to regrow the bark on the living tree, after stripping off the bark and covering it with moss did not lead to any practical results in Mungpoo, because the process is too slow and is not worth the labour spent on it."

The question of moss covering is still in hand, but now another point has arisen, *viz.*, the location of the quinine (see the annual report of 1877, p. 65) where it is said " the alkaloids, especially quinine, are contained more in the outer layers."

MCIVOR'S PROCESS OF STRIPPING AND MOSSING.

In 1878, " 22 experiments were made relating to the 'mossing and stripping process' as conducted by McIvor. The result of this process was said to be that the strip of bark which was covered with moss was better than an unmossed strip of the same tree examined a year previously."

"The observations could not be considered quite conclusive, as the barks were now a year older, and the increase in alkaloid could be ascribed to this, as all the trees had probably not reached the age when the bark yields its maximum. The renewed succirubra bark surpassed expectation, as the 19 months old pieces that were cut out contained on an average 3'29 per cent. of quinine.

"These experiments also showed that although new bark grows all along the strip at the same time and is, therefore, of the same age, the lower part generally contains more cinchonine than those above it, showing that the composition is not the same over the whole length of the strip. This changed proposition of the alkaloid from what they were in the original bark, which had taken place at the time of renewal, demands attention, and a study of this phenomenon should be very interesting when applied to other species."

Though the reports on Cinchona after 1878 contain much about the "mossing and stripping process," it may be remarked here that as this process became obsolete long ago it may be dismissed briefly. In practice, not much benefit has been derived from it, but it is desirable to methodically review the experiments in order to have a fuller knowledge of the chemistry of the life history of the Cinchona.

CONTINUATION OF MOSSING EXPERIMENTS IN JAVA.

In 1879, "new bark was taken from the five test trees shaved a year previously. One of them was left uncovered, three were covered with moss, and one was covered with palm leaves. These barks showed a remarkable likeness which led to the conclusion that at least at the commencement of the regrowth (say one year), a bark of constant composition is formed as regards alkaloidal content. The formation of so much cinchonidine in this young tissue (as is seen in renewed succirubra bark) was peculiar."

"In four test trees the percentage of alkaloid, chiefly quinine, had not reached the original limit, but one tree showed more in the renewed bark (8'00 per cent. quinine against 7'90 per cent.) which led Moens to note that this was not due to the moss covering, for then the two other covered trees should also show an increase."

"The investigations on the renewed succirubra bark were also continued, but no decrease in the percentage of quinine was observed. On the contrary, there seemed to be an increase. The renewed bark, 26 months old, even appeared to be of very high value (4'29 per cent, quinine against 4'17 per cent. after 19 months, at which age, however, 3'26 per cent. and 2'96 per cent. have also been noted)."

Lecturing before the Edinburgh Association of Science and Arts recently on "British Guiana: Its Resources and Industries," Mr. James Kay Small said that upwards of eight million acres of land suitable for the cultivation of Pará rubber were offered by the Government at an average annual rental of 1*s*. 9½*d*. per acre on a 99 years' lease. Of Balata, obtained from the bullet tree, it was estimated that there were 544 million pounds available, from which was being drawn less than 1¼ million pounds annually. The great forest belt covered 78,500 square miles, and contained much of the finest timber in the world.

RUBBER.

Castilloa Rubber in Jamaica.

Most of the samples that are produced here have been shown by chemical test to have a large amount of resin in them. All rubbers have this resin; the native milk with rubbers have it also, yet we have prepared almost milk-white samples of this rubber free from resin. Rubber, like most other products, can be prepared for market, and ought to be prepared for market, just as cocoa, coffee, etc., are prepared; not simply sent in a crude condition as it comes from the tree. The preparation of Hevea rubber in Ceylon is a very elaborate process. There are machines for separating the latex, for washing, for rolling, for pressing, and so on. These processes can be done on a small scale by hand.

We recommend all those who are tapping Castilloa rubber to carry a small can or bucket, and a spoon or brush, the latex is thus spooned or brushed as it oozes from the cuts into the water, as the latex from our Castilloa trees which are mostly of the Panama variety, is thick, and does not usually flow but oozes and coagulates quickly.

There is a great difference between the latex of Hevea rubber and that of Castilloa. The former does not cream or rise to the surface in water like the latter; this gives Castilloa an advantage as the finest samples can be prepared by hand. When the tapping is finished the water containing the latex should be poured through a sieve to separate the particles of bark and dirt; then the latex should be diluted with water again and passed through a finer sieve into a larger bucket or vat; this should be stirred a little; soon the rubber globules will come to the surface like cream on milk, and the remainder of the liquid is drawn off perfectly through a faucet at the bottom; fresh water is then poured into the vat, the mixture stirred about and allowed to settle again. This can be repeated several times, the result being finally a thick latex almost pure white. This can all be done in the same day that the latex is got. The latex can then be poured into round or square enamelled pans, or tins about one pint to each and allowed to coagulate, or a coagulant can be added to hasten the coagulation, using a forty per cent. solution of Formalin; some use acetic acid, or lime juice. and in Mexico they use the juice of the Moon Flower. Then when the cakes are well coagulated, the water is poured off, and these cakes can be put through an ordinary washing machine. that is with two or three rubber rollers, and pressed out thin. To give them an extra finish they can be again placed in vats of clean water, in which a trifle of Formalin has been added, and allowed to remain there for a few hours, then they are taken out and hung on racks to dry. At this stage they can be smoked with wood that burns but does not make flames or sparks. This helps to preserve the rubber. These rubber biscuits or cakes can be placed one on top of the other and pressed and shipped in cases to fit. If the biscuits are made square, they look better and pack better. Special pans—square, not round—would require to be made for coagulating; this is easy.

In Java there are about 400,000 Castilloa rubber trees, against 1.400,000 of Hevea. The Castilloa trees there are usually planted 24 x 12, the wide rows running north to south, and they are planted through coffee trees, and the experience there of Castilloa planted through the coffee trees is that after the first two years they grow more rapidly than trees planted in the open. They are tapped three times a year in the following way:—

Horizontal incisions are made beginning about one foot from the ground and going round one quarter of the circumference of the tree. These incisions are made about three inches apart, being but half an inch deep, or down to the cambium, and are continued until there are 30 of them, reaching to the height of 13 feet. The same operation is repeated on the next quarter of the trees, beginning at the top and working down, but a narrow strip of bark about one inch in width is left between these two series of horizontal cuts.

After a rest of three months the other half of the tree is tapped in the same way, and three months later the operation is repeated on the first half of the tree, the incision, however, being made about half an inch below the original cuts. As the tree is allowed to lie idle during the three months of the flowering season, it is, therefore, tapped only three times a year. This method of tapping produces about eight ounces of dry rubber a year from trees eight to nine years old.

Our system of tapping is quite different to that of Java, but we get about the same average yields from the same age of trees, but taking less of the surface of the tree. Here, from four to six V shaped cuts are made with at least eight inches to nine inches between them, and we do not go higher than a man's head on the trees. The width of the V cuts occupies one quarter to half the tree according to circumstances. We thus hope to be able to continue tapping the trees every three months permanently, as we can come back to tap between the V cuts the following year and then continue six feet higher up for two years, by which time the bottom cuts will be entirely healed. We have then still in reserve the parts of the tree over twelve feet if need be.—*Journal of the Jamaica Agricultural Society.*

Tapping Castilloa Rubber in Jamaica.

Mr. L. A. Wates, Agricultural Inspector, writes in the *Journal of the Agricultural Society*:—

No matter what crop we grow there are always certain things which have to be considered carefully before embarking on the cultivation of any particular product.

The selection of the site of planting, and consideration of suitability of the soil, the selection of seed or root stock from which we will grow our crop, the method of planting and kind of cultivation to be adopted, the system by which we shall reap our crop, the preparation and curing of our product to make it fit for market and finally the actual marketing of our productions are all matters that come under consideration in dealing with any sort of produce whatsoever.

For some time the Castilloa Rubber Industry in Jamaica has been receiving somewhat close attention and study, and very considerable progress has been made in getting to understand the conditions under which these trees may be grown, the sort of soil they do well on, and the conditions that have resulted in at any rate well grown and developed trees.

There is no doubt that given careful selection of plants or seeds and ordinary planter-like cultivation and care, rubber trees may be grown without much difficulty in many parts of Jamaica to give a reasonable return.

The question of marketing our Rubber product has not yet, however, reached a stage where it is imperative to go very deeply into it. On the other hand, the matter of reaping our rubber is one that must shortly, if it has not now, become one of great importance.

In my opinnon the whole question of whether a rubber cultivation in Jamaica will pay, given ordinary plant-like methods otherwise, depends on our methods of reaping the crop.

It will be found that the most expensive item of expenditure in an established rubber cultivation will be the tapping or drawing off of the latex from the rubber trees from my own experience of tapping a large number of rubber trees. I am certain and want to emphasise this that unless careful systematic and correct methods of tapping are adopted under the most scrupulous supervision in the first instance, and careful supervision afterwards, that there will be constant annoyance, difficulty with labour, waste of rubber and possibly loss in the end. I do not propose to lay down any absolute certainty as to the proper tool to be used or whether the herring-bone system or V shaped system, or one side tapping are the best, for the reason that, no doubt, these matters will in time be definitely settled for Jamaica. According to our present lights, it seems that the best tool to use is the Thompsom tapper, which, at any rate, makes a clean cut, that the herringbone system of incisions is mortly suitable for our trees, though in the case of trees where latex runs very slowly, I consider the V shape with a number of catching pans better; that the use of a drip pan with a small detachable channel to guide the latex into the pan is satisfactory and that the use of a large size picture-painters coarse brush helps to clean the channels and hurry the flow of latex. Granted that these are the tools and the methods so far found to work fairly well at the present, we come to the point of making the actual incisions in the tree, and here is where planters ought to take the most particular care.

The Castilloa Rubber grows naturally straight with a fairly smooth regular system. It is essential and highly important that these tree trunks never be grazed, chopped or cut down during their growth. Any chops or wounds on the tree trunk will mean trouble when tapping. The, what I may call, laying out of the tree or tapping is the crux of the whole matter in successful rubber tapping. Whether there are six cuts made on the side of the tree, say two feet apart or less or more, unless the cuts are made at the right angle there will always be difficulty and loss of latex by overflowing of channels, etc. The cuts must be made at an angle of 30 degrees at least, I prefer 25 degrees, upwards from the channel. At this angle if made carefully and with the help of the brush, almost all the rubber of all trees can be made to flow down to the drip-pan at the bottom. The tapping of a tree can be quickly done and no loss is sustained. On the other hand if the cuts are made less acute the result will be the constant dripping off of great clots of rubber, constant annoyance and loss and three times the time taken to tap a tree as by the other way of laying out. Moreover once done (and this is important) it will be found impossible in actual practice, to change the angle of the cuts without loss of latex by running off in wrong directions and dripping. This may seem a slight matter but the fact is from experience. Once get the trees correctly lined out there will be no more difficulty. I am certain that where twenty-five trees may be tapped in a day with correct lining, not ten could be tapped if incorrectly done; and that the results in latex would be in proportion not more than two thirds. Moreover it is most important to have fresh clean bark to cut as long as possible as the re-growth of bark is slow and takes a number of years to be fit for retapping. So far as my own experiments and experience go now I am inclined to think the cuts should be made from the ground up, two feet apart as high as can be reached by standing on a kerosene box which would give four cuts each side of a vertical channel, eight feet up, the next cut would be made in the centre between these cuts and so on. In my opinion a tree should not be tapped more than twice a year if regular and continous returns are wanted for a number of years. At twice a year, therefore, the lower portion of the tree would give tappings over five or possibly six years, if carefully done, always making the cuts two feet apart. After this period the next six feet up the tree might be tapped in the same way which would give another three or four years, This would give ten years for the first cuts to recover and tapping these might be resumed. My reason for thinking tapping should only be done twice a year, is that otherwise if done say three or four times, though the returns would be larger for two or three years, yet the tapping surface would be as quickly reduced to nothing, before the new bark had time to grow.

It is true that even the injured bark will bleed, if cut, but it is not possible to collect it or even cut it cleanly under these conditions as it tears out. It must be borne in mind, moreover, that as tapping is the chief expense incurred unless the returns are proportionate, it cannot be profitable to increase the number of times we tap.

The statistics as to yield, best time of tapping, etc., are now being collected and will, no doubt, solve many difficulties, but I am convinced it is not too early to let planters know the importance of protecting their trees from damage and setting out their trees for tapping correctly and carefully is success is dsired.

Pricking V. Paring

FINALITY in tapping methods is never likely to be reached, perhaps because different districts and conditions demand different systems. It seems, however, that in Ceylon there is a distinct movement in favour of pricking as against paring, of incision in preference to excision. Applied to the Manihot this is intelligible, but it is a surprise to find that the Hevea is being treated in this way. We understand that pricking is now being actively experimented with, and that the results are most encouraging. A very thin strip, a mere scraping, of the bark is removed to form a channel down which the latex can run; the pricking is said to induce a freer flow of latex, and the chief danger to be avoided is that of over-tapping. The trouble of bark removal is avoided. It must be understood that so far the stem is in the experimental stage. Mr. C. E. Welldon tells us that on the Diviturai Estate the pricking system has succeeded well up to date, and in his opinion it is a less exhausting system than paring, whilst the Company is getting a higher price for its scrap. Experienced planters whose view we have invited are puzzled; they do not quite understand this development. Further results will be studied with interest.—*Rubber World.*

AMERICAN IMPORTS OF TEA.

The following table of American imports of tea is published by the United States Department of Commerce and Labour:—

	From				
Year.	China. lbs.	Japan. lbs.	All countries. lbs.	Value.	Avg. per lb.
1894	50,495,188	37,980,937	93,518,717	$14,144,243	$0·151
1895	54,700,393	36,941,394	97,253,458	13,171,379	·135
1900	42,283,189	33,949,350	84,845,107	10,558,110	·124
1904	53,157,332	42,700,127	112,905,541	18,229,310	·161
1905	43,122,798	41,970,050	102,706,599	16,230,858	·158
1906	37,466,719	37,812,684	93,621,750	14,580,878	·155
1907	31,231,259	37,411,653	86,368,490	13,915,544	·161
1908	27,293,278	46,944,430	94,148,564	16,309,870	·173
1909	33,833,377	44,072,162	104,484,550	16,553,032	·158
1910	24,394,663	50,124,382	98,108,939	16,631,486	·169
1911	17,993,553	57,284,989	104,165,654	18,317,171	·176

—*Spice Mill.*

The Planters' Chronicle.

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(INCORPORATED.)

The Secretaryship.

Mr. Ormerod has resigned the appointments of Secretary to the U. P. A. S. I. and Honorary Secretary, S. I. P. B. F. and will vacate office on July 31, 1912.

A Meeting at Chickmaglur.

A combined meeting of the Mysore Planters' Associations was held at Chickmaglur on the morning of 25th May to meet and welcome Mr. G. N. Frattini, the Scientific Assistant for Mysore. The meeting was well attended, each Association being well represented, and a delegate from the Coorg Planters' Association was also present by special invitation.

In formally introducing Mr. Frattini, the Scientific Officer, who had accompanied him from Bangalore, spoke as follows:—

"Now that the Assistant Scientific Officer for Mysore is an actuality instead of only a possibility we have to make up our minds how we can best use him.

"There is a strong feeling present among you, I know, that your Scientific Officers should constantly visit the different estates and give advice and teach. But you must remember that before they can do that they must accumulate knowledge and in many cases that can only be done by dint of years of laborious research. Much of our present knowledge has been and can be communicated to the planter by means of correspondence and through the medium of Bulletins and the *Planters' Chronicle*, and I would urge on you not to forget the need of time for research work. Many problems await solution but these require time and brains for their solution, and especially *time* must be forthcoming. If you keep your Scientific Officers constantly on the move visiting estates, you will make no permanent advance in knowledge, but if you will give them a reasonable amount of time to devote to research progress is certain. To quote from an article in the April number of the *Tropical Agriculturist* dealing with this subject, 'If existing knowledge is limited the course of future discovery possesses no definable limitations. Given time, training, and ingenuity in devising new methods of attack upon outstanding problems, our knowledge of scientific agriculture cannot fail to progress steadily and surely, In agriculture, no less than in other lines of research, past successes augur well for future progress.'

"There are no doubt a large number of problems which all Coffee planters would like to see worked out, but since life is short, the Scientific Department must be allowed to concentrate their attention upon a few of these only. In my humble opinion, with the exception of Stump Rot, as far as Mysore is concerned Coffee diseases are of minor importance, and are very largely controllable by methods of cultivation, and the most important problem is the manurial one. It is because I have formed this opinion that I asked that the first Assistant in Mysore should be primarily a chemist, that he might bring the training and mind of a chemist to bear on a chemical problem, and I sincerely trust that the Scientific Department will be allowed to devote a large part of their time during the next five years to the study of the manurial problem.

"The study must follow three main lines, *viz* :—

(1) What manures to apply
(2) When to apply them
(3) The most economical quantities to apply,

and the first two must be solved before the third.

"With regard to the first question, what manures to apply, I have come to the conclusion after three years study of local conditions that it is usual to neglect the manurial value of the natural mulch of leaves in old established coffee and to apply too much Nitrogen to it with the result that there is a tendency to grow leaf and wood at the expense of crop. I have recently published in the *Planters' Chronicle* my reasons for this opinion and an account of some preliminary work done on the question. I find that some tons of natural mulch are deposited on each acre under well established shade every year and that this mulch contains a high percentage of Nitrogen.

"The conclusions to which this preliminary work point will be followed up under the personal supervision of the Scientific Assistant and I hope he will be given facilities for experimenting with Potash and Phosphate and less Nitrogen for Coffee.

"With regard to the second question, when to apply manure, I have also begun work and have discussed with the Assistant the lines along which the experimental work should go. I do not propose to discuss this matter here to-day but will merely say that it is very striking that an analysis of the ripe Coffee berry shows a very high percentage of Potash and that we propose to first of all try to discover at what stage of the ripening of the berry this Potash is most needed.

"Such experimental work as this is likely to produce knowledge of facts which will be of immense value to Coffee planters, but remember that it will take time and need close attention and that careful experimental field work and constant touring do not go well together.

"It now remains for me to formally introduce to you Mr. G. N. Frattini, and to retire as gracefully as possible into a back seat as far as Mysore is concerned. In doing so I would ask for him your kindly indulgence, remembering that he is at present new to tropical conditions of agriculture and he is fully aware that he has much to learn before he can begin to teach. I would ask you to take him into your confidence and help in every possible way to make that learning period a short one. That Mr. Frattini is keen and very willing to work and learn I have already discovered. That he will receive a hearty welcome from you I know, and I feel sure you will accord him that whole-hearted sympathy, courtesy and hospitality which you have always so generously accorded me.

"Gentlemen, this is a red letter day in the history of the Mysore Planters' Associations and before I sit down I feel that I must express to you my personal pleasure at seeing a scheme which has been very dear to me consummated to-day, and must congratulate you upon the possession of a Scientific Assistant of your own. I very much appreciate the way in which you have met my demands and wishes for a Scientific Department, and I am happy to say that your example is very closely followed by Coorg, whose Assistant will be here before the end of the year. I can assure you that we on our part shall do our very utmost to make this experiment of yours a success.

"Finally I think you will agree with me that we should not forget when congratulating ourselves to congratulate and thank Mr. C. H. Browne, who was the prime mover and organiser of the Assistant Scientific Officer scheme which we see consummated to-day in the presence at this meeting of Mr. Frattini."

After Mr. G. N. Frattini had been formally welcomed, an informal discussion took place on the subject of Coffee manuring, and the Scientific Officer was asked a number of questions.

In the afternoon the Scientific Officer attended a meeting of the Council of the Mysore Associations and discussed with them, in detail, the procedure to be adopted with regard to the arrangements for and control of the Scientific Assistant's work, and also certain financial matters. A number of outstanding points were settled, and the decisions of the Council were recorded in the minutes of the meeting.

On 26th May the Scientific Assistant for Mysore left Chickmaglur to begin a tour of the Bababudins. He is expected to be back at Chickmaglur about 7th June and will immediately proceed upon a tour of the Kalasa District.

The Scientific Officer left for Bangalore during the morning and is now at head-quarters.

Coffee Hybrids in Mysore.

Mr. W. L. Crawford has kindly furnished the following information with regard to an Arabian-Liberian Hybrid on one of his estates in Mysore. The coffee from a single tree was picked separately and gave seven pounds of clean coffee. This was reported upon by the brokers at home as follows:—

DESCRIPTION—*Raw*.—Heavy, brownish, unsized coffee, still chiefly Liberian in character.

Roast.—Fair, some bad pales.

Liquor.—Fair but coarse.

Value per Cwt. 76*s*. to 78*s*.

"The small sample you have addressed to us arrived by last mail, and has been handed over to one of our Brokers, whose Report and Valuation we enclose herein. It is difficult to advise you in regard to the planting of this class of coffee, though we are all of opinion that when coffee values have declined, as we suppose they must sooner or later, this class of coffee will rank with the inferior types, so we think, therefore, the more important question for you is whether the Hybrid Coffee will yield steadier crops than your present Arabica."

With this yield low prices could be faced with equanimity, and it will be seen that a Hybrid of this type, which is admittedly not one of the best, is better than the ordinary Arabian at its best. Hybrids grow big and will have to be planted about 12 feet x 12 feet.

On an equilateral triangle method of planting this gives 348 trees to the acre so that a yield of 7 lbs. of clean coffee per tree is well over a ton an acre.

Scientific Officer's Papers.

C.—TAPPING EXPERIMENTS WITH HEVEA RUBBER IN CEYLON.

No. 8 of Volume VI of the Circulars of the Royal Botanic Gardens, Ceylon, has lately come to hand, dealing with a number of Hevea Rubber tapping experiments. Mr. Lock prefaces this Circular by saying "*after nearly four years of continuous work some of the experiments are beginning to arrive at a stage when more or less definite conclusions can be drawn from them*," a statement which I have italicised because there is a tendency among some planters in Southern India to expect definite conclusions from the result of an experiment in a year or even less. Agricultural experiments require patience and continuous work before any conclusion at all can be extracted from them, and those carried out at Rothamstead over a period of 50 or 60 years are the classical instance of the only safe and sure way to obtain *definite* conclusions.

The first experiment dealt with in the Circular is that of the yield from a tree planted in 1876 which now has a girth of 125 inches. This tree has been tapped on "600 days between December 1908 and January 1911 by a system which removed the whole of the outer bark to a height varying between six and eight feet, upwards of 54 square feet of bark being thus removed from the tree. The system of tapping was a drastic one consisting of daily paring and pricking." The preliminary stripping of the original bark yielded 174 lbs. of dry rubber during a tapping period of 25 months. During 1911 the renewed bark was tapped and a daily tapping during five months gave a yield of 67 lbs. of dry rubber. In summing up the results Mr. Lock says: "The brief summary of progress recorded in this section of the present Circular may be concluded with a word of warning. The heavy yield of latex and rubber obtained in the case of this particular tree from renewed bark less than two and a half years after the first tapping of the same area cannot be regarded as evidence that two and a half years is in general a sufficient interval for renewal on an average plantation. In regular plantation work a growing consensus of opinion regards four years as the minimum period which should be allowed for the renewal of pared bark in order to ensure a permanent healthy growth of the trees."

The second series of experiments discussed in the Circular deals with the yield at different levels on the same tree. The results are summarised as follows:—

"Twenty nine trees approximately 15 years of age and having an average girth at 3 feet of 36 inches yielded nearly 10 lbs, of dry rubber a-piece by paring on 298 days distributed over a period of exactly one year during which the whole of the outer bark was removed to a height of 6 feet.

"All the trees show good renewal and only a few show slight signs of injury to the bark.

"The total yield of the first side tapped (November to May) was 147·5 lbs. and from the second side (May to November) 132·5 lbs.

"Of the total quantity 105 lbs. was obtained from the six upper cuts of the system and 174 lbs. from the six lower cuts.

"Towards the end of the tapping of each half of the tree by far the greatest quantity of rubber and latex comes from the lowest cut only.

"A marked response in yield to season (or climate) is indicated.

"The evidence tends to show, though not quite conclusively, that a large part of the rubber yielded is produced locally under the stimulus of tapping."

RUDOLPH D. ANSTEAD,
Planting Expert.

RUBBER.

Cost of Production in Malaya.

The majority of investors in rubber plantation companies have long since realised that the most rapid growth and the largest yields are to be associated with estates in the Malay Peninsula; in fact, it would be no exaggeration to say that an average yield of 250 lbs. per acre per annum can be expected from six-year-old trees in Malaya, as against one of 150 lbs. per acre in Ceylon. These satisfactory results were not known to the pioneers, but it is a peculiar coincidence that the Malay Peninsula appears to have been selected by Government authorities as an area which would stand a somewhat heavy rate of taxation. It has been suggested by many leaders of the plantation industry that the reason why costs of production are so much higher in Malaya than elsewhere is that the taxes in the form of rent payable to the Government each year, drainage assessments, and the *ad valorem* duty of 2½ per cent. are excessively high, and represent several pence per lb. on the cost of rubber. Some little correspondence has been published in the press with regard to this, Government officials maintaining that it is by no means criminal to tax a successful industry, and to use the revenue derived by such means for the development of poorer states.

While we admit that all this taxation has quite a marked effect on the cost of production, we cannot agree with the suggestion sometimes thrown out that taxation in Malaya is the main offender. In the first place, we know only to our regret that the costs of coolie labour in Malay are far in excess of those in Ceylon; in point of fact the dollar in Malay appears to be only equal to the rupee of Ceylon in its purchasing capacity. Again, we know that a salary of £500 or £700 in Malaya for young managers is very frequent, whereas in Ceylon such a salary would be considered quite good, and would only be given to men with considerable experience. Ceylon will always on account of these difficulties be able to stand the strain of smaller annual returns. Coolie costs, costs of European management, and even also of London management, are far greater to-day in connection with rubber than they have ever been with tea companies in other countries. we therefore think that these features must in fairness be allowed for when criticism is being offered on the subject of taxation by Government, and its effect on the cost of producing rubber.

During the last few weeks the accounts of several important and highly-reputable rubber companies have been published, and we cannot but admit that the actual cost of producing rubber on these properties has been far higher than we or anyone else anticipated. Take for instance the Straits Rubber Co., Ltd. The cost of production, free on board at Penang, including commission to the staff and depreciation, was 1*s*. 7·83*d*. per lb; adding to this London expenses, freight. insurance, landing and sale charges, the total cost amounts to just over 2*s*. per lb. Now such a cost would perhaps not have occasioned surprise if it had been associated with an estate just coming into bearing, or with a very small crop. As a matter of fact, the crop harvested for 1911 at a cost of 2*s*. per lb., was no less than 985,279 lbs. The areas being tapped were planted from 1904 to 1907, and were therefore comparatively young; as this acreage amounted to nearly 4,000 acres, a cost of 2*s*. per lb. can only be regarded as excessive. It is true that in the case of this estate a very highly efficient staff is maintained in the East, and we should be sorry to hear of any reduction in salaries or, officers in connection with that part of the Company. It is, however, to be hoped that with a crop of 1,400,000 lbs., as estimated for the present year, a considerable reduction in cost of production will be achieved. If such a crop cannot be harvested at much less than 2*s*. per lb., we are afraid that many smaller concerns will soon feel the pinch.

Again, we might take the Selaba Rubber Estates. The crop for 1911 of 201,042 lbs. cost, including London and all estate charges, 2*s*. 4·19*d*. per lb. The same remarks would apply in this case as to Straits rubber.

The Klanang Produce Company appears to have effected greater economy in so far that their 167,250 lbs. were harvested at 1*s*. 2*d*. c.i.f. London, or 1*s*. 8·15*d*. per lb., including proportion of London expenses, bonus, depreciation, etc.

In the case of Glenshiel Rubber Estates, the cost of the rubber in 1911 worked out at 2*s*. 10*d*. per lb. f.o.b., a figure which is admittedly high for a crop of 89,095 lbs. The Chairman at the last meeting explained that this was due partly to the expense incurred in clearing the estates, and also by drought affecting the yield from the young trees. On Glenshiel Estates all the trees are comparatively young, and it is easy to see that a very large reduction in cost will soon be effected.

On most of the estates referred to above, a comparison is all the more valuable, because we are dealing with estates essentially planted with rubber trees, and not with intercrops over the greater part of the acreages.

Coming now to quite another group of estates, we must first refer to the Bikam Rubber Estates, Ltd. That company harvested 94,214 lbs of rubber in 1911, and the cost of production f. o. b. Port Swettenham was 2*s*. 6·28*d*., as against 2*s*. 4·13*d*. for 1910. Here the increased cost was said to be due to heavier charges incurred in connection with recruiting of labour, the cost of extending hospitals, and the clearing up of the timber. It is, we believe, now commonly accepted that even though it may cost as much as £5 per acre to clear away the large timber, it is advisable to do so on account of the ravages of fungi and white ants on estates not thus properly cleared. This, however, can hardly be said to have entered into the cost of production for companies such as Anglo-Malay Company harvested 780,972 lbs. of rubber, the cost f. o. b. Port Swettenham was 1*s*. 2·32*d*., an increase of 1·66*d*. per lb. over that for 1910. The increase was attributed to higher expense for hospitals, labour, recruiting, and tapping. The cost of production when London expenses, bonuses, freight, insurance, landing, and all sale charges were added, was 1*s*. 8¼*d*. a figure which we should like to see materially reduced for an estate in such an advanced stage. The costs do not seem to compare very favourably with those on Goldon Hope, where in 1911 a crop of 10,955 lbs. was harvested, at a cost f. o. b. Port Swettenham, of 1*s*. 1½*d*., against 1*s*. 0¾*d*. in 1909. In this case, however, the addition of London expenses, freight, etc., brought the total cost to nearly the same as Anglo-Malay, *viz*., 1*s*. 8·91*d*.—*India-Rubber Journal.*

Dr. Schidrowitz on Rubber Latices.

Dr. Philip Schidrowitz delivered the second of the special series of lectures on Rubber arranged by the Imperial College of Science and Technology in the Chemistry-Lecture Theatre of the Royal College of Science. The lecture dealt with the chemical and physical properties of rubber latices, with the theory and practice of coagulation, and, finally, with the commercial preparation of various types of crude rubber. The lecturer pointed out that no single theory could be formulated which would cover all the remarkable phenomena attending on coagulation, the reason being that latices from different species varied most markedly in regard to their physical and chemical properties, and even within the same species considerable essential differences occurred. These facts were of very great practical importance, and the neglect to appreciate them in the past had been the cause of the loss of much time and money. Even now, the facts were not fully grasped by many of those engaged in the plantation industry, and the result was a greater variability in regard to quality than was either necessary or desirable. Much work remained to be done before it would be possible to state with certainty that the Plantation manager could produce from any given batch of latex the best possible result in regard to quality and quantity of rubber, but considerable progress, was being made, and students of the Royal College of Science would be glad to hear that good work was being done on the plantations, in this direction by several gentlemen now graduates of this College, and but lately their fellow students. A fair proportion of plantation rubber was, in his opinion. already superior to any other rubber produced, not excluding "fine hard" Pará, and there was very little doubt that at no very distant date it would replace the latter as the standard of quality. As chemist, Dr. Schidrowitz thought they might be particularly interested in the high grade rubber produced by a chemical process from a very low grade raw material—namely, Jelutong. Specimens of the latter, as well as of various grades of plantation rubbers, crude rubbers, and of latices, were shown, and the lecture was further illustrated by lantern slides.—*The Rubber World.*

The Botanical Sources of Rubber.

Mr. Herbert Wright, in his lecture delivered at the Imperial College of Science on Monday last (April 30), predicted that there was in view a marked change in the brands of rubber likely to come on to the world's markets in the near future. The tendency would be to maintain most of the old Brazilian brands, but in a purer state, and to gradually supersede African with American types. Ultimately the lecturer anticipated that the fine hard Pará type would predominate and that grades of Hevea rubber would rule the market. He calculated that in the past the genus Hevea had been responsible for 40 per cent. of the world's total crop, but that in the future it would total quite 80 per cent. He pointed out that of the various types of structures wherein latex accumulates, the only type which had so far been a commercial success was the articulated—a form in which the latex tubes are formed day by day by the gradual disintegration of the elements of the bark. Hevea and Manihot had the articulated type. *Ficus elastica* (Rambong) and Castilloa had not. He also maintained that although in the case of Pará, Ceará, Rambong, and Guayule one species only of plant was the source of the rubber in each case, in most other brands of rubber many species, often belonging to different genera, contributed. Dealing with catch crops, he said that Java cultivated a greater variety of such crops than any other country, and in the lecturer's opinion was more over-planted than any other he had seen.—*The Rubber World.*

In Peru.

The following information is from the report by H. M. Consul at Iquitos (Mr. G. B. Michell) on the trade of that district in 1911 :—

The outlook for the rubber industry during the year 1912 is a gloomy one. Official statistics show that the exports of rubber have been declining since 1907, and although the smaller quantity exported in 1910 was counterbalanced by the high prices of that year, in 1911 there was a deficiency of 212 tons with prices of an average of 50 per cent. under those of the year before.

BEES.

The Honey-bee as a Fertilizing Agent.

Dr. E. F. Phillips, writes in *Gleanings in Bee Culture*:—

The honey-bee is known widely as the producer of honey, and it is recognised that this makes it one of the minor agricultural animals. The total value of the crop produced is not fully realised, and it is often a surprise, even to well-informed bee-keepers, to learn that the average annual honey crop of the United States is worth about $20,000,000. The American farmer produces crops of such gigantic proportions that a branch which cannot be discussed in the millions is scarcely worthy of consideration. Even in this galaxy of wealth the honey-producer has no reason to be ashamed of his speciality, and he may be further congratulated on the fact that his field is just beginning to be occupied. We cannot yet foresee an overstocking of the country, and an over-production of honey will not take place until we are producing at least ten times what we do now.

The subject which is here announced at this time does not, however, deal with the direct benefits which accrue to American agriculture through the offices of the honey-bee, but to what may be styled the indirect benefits. These are recognised by specialists, but are passed over unnoticed by the average farmer or citizen, and it is to recount the indirect benefits that this subject is assigned.

POLLINATION OF FLOWERS.

As is well known, blossoms, before they set, must be pollinated. That means that pollen from the anthers, or male portion of the flower, must reach the stigma, or female portion. Different plants exhibit wide variation in the arrangement of these parts, and it may be well to recount some of these different plants. In some cases the male and female organs are in separate flowers, as in the case of corn, the male flowers being the tassel and the female flowers resulting in the ear. In other cases the types of flowers are borne on separate plants, as in the case of the mulberry.

In the majority of plants, both anthers and pistils are found in the same flower; but even here an extremely wide variation is found. In some cases the anthers ripen earlier than the pistil, so that the pollen produced is ineffectual in producing fertilization of that particular flower. This is shown in the fireweed, or willowherb, which is an important honey plant, especially in Northern Michigan. The reverse condition in which the stigma matures is first observed in the common figwort *Scrophularia nodosa*, and to some extent in horse chestnuts.

In other cases, the anthers and pistil mature at the same time; but because of their relative position, self-fertilization of the blossom does not occur. Other arrangements of this kind might be mentioned; but enough has been said to indicate that flowers are often so arranged that self-fertilization is impossible. In some cases of pears and plums it has been shown that the pollen is ineffectual in fertilizing the flower, even if placed on the stigma. These arrangements all confirm the popular belief in the dangers of close inbreeding; and point to the desirability and often the necessity of cross-fertilization.

Fertilization of plants occurs in two general ways. Plants like willows, pines, oaks, and birches, and, in general, plants whose flowers are inconspicuous and often not even recognised by the layman as flowers, are so constructed that pollen is carried by the air currents from the anthers to the pistil. The pollen of such plants is light and dry. Most flowers, however, are not of this type, but require some agent to carry the pollen, and these agents are usually insects. Without the kindly offices of insects which are despised as an order of animals by the majority of people, our fruit crops would cease to be, and the flowers which abound would no longer bloom.

RELATION BETWEEN PLANTS AND INSECTS.

It may also be said that plants have a greater appreciation of the insects than we have, for we see the most wonderful arrangements for attracting insects to the flowers so that their visits will result in cross-fertilisation. The pollen is not intentionally carried and put in the right place, but is transported on the hairs or otherwise as the insect goes from one flower to another. Insects go to flowers to gather pollen or nectar to be used as food at once, or to be removed and stored, as in the case of the honey-bee. Pollen is produced in such abundance as to act as an attraction to pollen-feeding insects, and still leave a sufficient quantity to insure proper fertilization. Nectar acts also as an attraction, and probably serves no other purpose to the flower.

The question of what insects are most important in carrying pollen has not been sufficiently investigated. In the comprehensive investigations of Muller, he found that in low Germany 2,750 out of 6,231 visits of insects to flowers observed were made by *Hemenoptera*, and of this number 2,191 were by *Apidae*, the family to which the honey-bee belongs. He frequently refers to the fact that on some plants the honey-bees and bumble-bees play "by far the most important part in fertilising our (German) indigenous flowers." Waite, in his bulletin on "The Pollination of Pear Flowers" (Bul. 5, Div. of Veg. Pathology, U. S. Dept. Agr.), mentions a large number of species of insects which visit pear blossoms, but says: "The common honey-bee is the most regular and important abundant visitor, and probably does more good than any other species."

In an article read before the Ontario Bee-keepers' Association in December, 1900, by the late Dr. James Fletcher, he said: "It can be shown that, owing to its size, weight, and habits, no insect is so well calculated to ensure the fertilization of fruit-blossoms as the honey-bee, which flies rapidly from plant to plant, and, by running over the flowers in search of pollen or nectar, brushes off the pollen and carries this vitalizing element on the hairs of its body to the next flower visited. The habit of the bees, which has frequently been noticed, of confining the visits, when collecting, largely to the same kind of plant, is taken advantage of by the bee-keeper to store up at certain seasons particular kinds of honey, such as apple, raspberry, basswood, clover, and buckwheat honeys. This habit is also manifestly advantageous to the plants on account of the pollen which is carried by the bee being of the kind necessary for the fertilization of its flowers, which could not be affected if the pollen were that of some other kind of plant."

In some work done at the Michigan Agricultural College it was shown that, of all the insects collected on apple trees in bloom, none were so abundant as the honey-bee. On the other hand, similar collections made at the Connecticut Experiment Station at New Haven showed very few honey-bees. The latter results may be explained by the fact that, in the preceding winter, over seventy-five per. cent. of the colonies of honey-bees in that section of the country died, and by the fact that bee diseases had probably further reduced the number of bees in that section, as they are abundant in that State. Moreover, we should not expect to find many bees in a city on the seashore. The growing of cucumbers under glass is an important industry in Eastern Massachusetts and in other parts of the United States, The Massachusetts cucumber-growers annually use about 1,000 colonies of bees in their greenhouses to pollinate their blossoms, in place of the former method of pollinating by means of a camel's-hair brush.

While the honey-bee is, perhaps, no better equipped than other insects, especially other bees, for carrying pollen, there is one respect in which it outranks all the others as a valuable asset to the fruit-grower. We are not able to propagate other insects in quantity, and introduce them to orchards at the proper time; but it is a very simple matter to carry in colonies of bees to insure a crop, if the weather is fit for bees to fly, Many orchardists realise this, and keep bees solely for the benefits derived from cross-fertilization of the fruit-blossoms.

COMMON INTEREST OF THE BEE-KEEPER AND FRUIT-GROWER.

The interests of the bee-keeper and of the fruit-grower are identical. In the past there has arisen from time to time bad feeling between these two classes of farmers. The fruit-grower claims that the bees destroy his ripe fruit; but this has been entirely disproven. Bees never suck ripe fruit unless it is previously punctured by birds or insects, such as wasps, or unless it is decayed. On the other hand, the beekeeper claims that the fruit-grower sprays his trees while they are in bloom, thus killing the bees. This procedure is not recommended by any entomologist, and is not practised by well-informed orchardists. It is prohibited by law in New York and in some other States. Cases of this antagonism are still to be found, but they are becoming more and more rare. Let us hope that the time will soon come when the bee-keepers and fruit-growers will meet in common conventions to discuss their problems in common.

The production of the millions of dollars' worth of fruit in the United States depends largely on insect pollination; and no insect is so important in this work as the honey-bee. It is a most conservative estimate to claim that the honey-bee does more good to American agriculture in its office as a cross pollinator than it does as a honey gatherer.

Bees worth a Hundred Million Dollars as Pollinators.

Having occasion recently to deliver a talk on the relation of bees to horticulture, at the Ontario Agricultural College, Guelph, Canada, we made the statement that bees produce annually $20,000,000 worth of honey; but that their economic importance to the fruit-grower and the consumers of fruit in this country could be measured by five times that in the production of more and better fruit and better crops. After we had concluded our talk we asked the botanist who heard this talk if this statement, in his opinion, was too strong. He very promptly replied that it was not.

Neither the bee-keeper nor the fruit-grower fully realizes the important work the bees perform in pollinating fruit-blossoms throughout the country, especially the finer fruits, such as plums, cherries, peaches pears, and most apples. There are very few fruit trees that are self-pollinating. Charles Darwin made the statement that nature abhors self-pollination. As bees, in most cases, are about the only insects that are in the air at the time most of our trees are in bloom, it follows that they are the main sources of cross-pollination. Fortunately, our best horticulturists and fruit-growers are to-day the bees' best friends. It is only the narrow-minded and the uninformed who complain of the bees being a nuisance in orchards and vineyards. The overripe and otherwise imperfect fruit from damage or otherwise should be picked off early and marketed locally rather than to hang on the trees, or, worse yet, lie on the ground in a half-rotted condition, attracting the bees.—*Gleanings in Bee Culture.*

Bees in Relation to Horticulture.

By H. Harley Selwyn.

That the honey-bee (*Aphis mellifica*) forms an important link in successful agriculture is now very generally recognized. The large annual production of honey and wax due to the industry of these insects is of very considerable economic importance; but in addition they probably play almost as important a part in materially increasing the yield and quality of the various fruits in the orchards and gardens scattered throughout the land.

That bees are intended by nature to aid in the pollination of flowers, there is no doubt, as the pollen and nectar secreted by the flowers are both absolutely essential to the life of bees, and consequently they are eagerly sought for by them. It is true that other insects, as well as atmospheric conditions, aid in this work of pollination to a considerble extent; but these other insects are comparatively few in number during the earlier part of the season, and besides, they appear to visit the flowers only for the nectar which they contain, whereas the bees are in search of both pollen and nectar; and at the time when orchards are in bloom the requirements of the hive, on account of the many thousands of young larvae therein, require large quantities of pollen. For this reason, if climatic conditions should be unfavourable for the secretion of nectar, the bees would, neverthless, visit the blossoms in order to gather the pollen which is so necessary, and in so doing accomplish the end in view, namely, that of transferring particles of pollen from one flower to another, or from the stamens to the pistils of individual flowers, and thus bring about their proper fertilization.

If the Bees are kept away no Fruit will set.

Numerous experiments have proved conclusively that comparatively little fruit will set if fertilization depends solely upon the carrying of the pollen by the wind and other minor agencies. In proof of this it has been recorded that two trees of the same kind, both heavily laden with bloom, were selected, the one being protected with cheese-cloth and the other left uncovered, with the result that the former set practically no fruit while the one left accessible to the bees, of which there were large numbers in the vicinity, owing to the proximity of an apiary, bore an abundant crop. This is but one of the many striking examples which might be cited to show the importance of bees in relation to horticulture.

There are, it is true, seasons when fruit trees of all kinds are so heavily laden with bloom, and the weather conditions are so ideal for pollination, that, even with the ordinary agencies, sufficient fruit is set to insure good crops. Unfortunately there is also the reverse side of the question when the period of fruit bloom is accompanied by dull, cloudy, and possibly wet weather, with but scant periods of sunshine. At such a time the farmer of fruit-grower who is fortunate enough to have a large apiary in or near his orchard will surely benefit greatly, as, even if there are only a few hours of sunshine each day, tens of thousands of bees will visit the blossoms during that period and effect the necessary fertilization which otherwise, owing to unfavourable conditions, might and probably would not have taken place. It would be very difficult to say just how many colonies are required to the average acre, whether it be trees or flowers that the bees are forced to visit; but it is safe to say that most localities are never overstocked with these very necessary insects. In fact, it is generally the reverse; and as a result there are undoubtedly many tons of honey going to waste annually for the lack of gathering, not to mention the hosts of plants that never succeed in accomplishing that most necessary function, namely. the proper development of the seed ovary, and consequently do not reproduce their species to nearly the extent that nature intended.

SPRAYING DURING FRUIT-BLOOM INJURIOUS.

So much has been said and written on the subject of spraying and its important relation or effect on bees that it is hard to deal with the subject in other than a general way in an article of this nature; but perhaps a general resumé of the main points would be of interest.

The question of poisonous solutions used in spraying to combat the many injurious insects and fungi peculiar to fruit trees and bushes of all kinds, and the proper time for their application is one which is worthy of careful attention, especially in view of the fact that spraying is now being advocated as the one and only means of insuring the production of perfect fruit. It might be expected that the individual who owns an orchard, even though it be a small one, and who has become sufficiently familiar with up-to-date methods to practice spraying, would realize the injurious effects such spraying will have on any bees in the neighbourhood if this work is done during the period of fruit bloom, and, consequently, would refrain from making the applications at so critical a period; but, unfortunate to relate, there are still far too many occurrences of this nature as the seasons come around, notwithstanding the efforts of the numerous bee-keepers' associations to enlighten these misinformed individuals.

BEE-KEEPING AT EXPERIMENT STATIONS.

That the importance of bee-keeping is becoming more and more generally recognized in the United States and Canada is evidenced by the fact that specialists are being employed and apiaries established in connection with the various agricultural colleges and experiment stations of both countries. It is to be hoped that, by this means, in addition to the mass of useful information on the subject contained in the leading agricultural journals of the present day, this important branch of agriculture will make rapid strides in the future. Notwithstanding the educational opportunities on the subject and the improved methods now available, there will, probably always, be a large number of bee-keepers who will continue to keep their bees in a haphazard way—that, is, in the old box hive or any other receptacle handy. It is, however, an ill-wind that blows nobody good, as the saying goes, for the rapid spread of American and especially European foul brood may, perhaps, in the end, prove to be a blessing in disguise, inasmuch as it is almost sure to put out of business thousands of these so-called "bee-keepers" who in reality do more harm than good in the neighbourhood, as their bees are too few in number to be of very material assistance, but at the same time capable of transmitting the honey containing the germs of these malignant disease.—*Gleanings in Bee Culture.*

THE SAO PAULO COFFEE CROP.

The Economist of April 27 reported:—Our Brazil correspondent writes: The Associacao Commercial of Santos has published an estimate of the current and next coffee crops, from which it appears that 9,636,000 bags (of 60 kilos) is the total expected to be shipped from Santos for 1911-12, the average outturn per 1,000 trees working out at 60½ arrobas, or, say, about ·89 kilo. per tree. For the 1912-13 season the crop is only figured at 6,895,000 bags, the average per 1,000 trees being but 42 arrobas, or ·617 kilo. per tree.

The Planters' Chronicle.

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(INCORPORATED.)

The Scientific Assistant (Mysore).

The Scientific Assistant for Mysore has completed a tour of the Bababudin Hills, and will leave Chickmagalur on or about the 9th June for the Kalasa District, when he will make a short tour of inspection before halting during the monsoon at Mavinkere Estate. During the monsoon he will especially devote his time to the study of 'Black Rot' and preliminary experiments for its control.

Proposed Manurial Experiments.

It is very gratifying at this early stage of the working out of the Scientific Assistant's scheme to be able to record a development that has occurred and that may tend to greatly enhance the interest attaching to the scheme as a whole.

Mr. Paul Friedrichsen, representative of the Agricultural Department of the Kali Syndikat (Potash Syndicate) of Germany, has addressed the following letter to the Scientific Officer:

"Referring to our correspondence of the 16th and 25th of March with regard to the question of an eventual subsidy to be offered to the U.P.A.S.I. by the Kalisyndicate, for the purpose of carrying out through your mediation manurial Experiments in the Coorg and Mysore Districts, I have now the pleasure to inform you that I have received a cable from the Kalisyndicate, in which they state that they fully agree to the Proposals, which I have latterly submitted to them in respect to the above matter.

These proposals were the following ones:

"1.—That the Scientific Assistants of the U.P.A.S.I. might be allowed to carry out in the said Districts manurial Experiments with Coffee, Rubber, etc.

2.—"That the Kalisyndicate should offer a subsidy of £100 per annum, commencing on 1st January 1913, for each District, which amount is so far considered as being sufficient to cover the expenses of the Experiments, and also the cost of the necessary Manures, etc.

"I may add that the Kalisyndicate is not especially interested, in which form Phosphatic and Nitrogenous Manures are applied, but lays stress upon the fact that the same are given together with Sulphate of Potash.

"The Syndicate further expects to receive from time to time a short Report as to the progress of the Experiments going on, which Reports, it is understood, are confidential and not for publication. Later on the final results will be submitted to the Kalisyndicate, but these results will not be published until publication is agreed upon between yourself and the Kalisyndicate.

" Hoping that you might find an early opportunity of laying this scheme before the U.P.A.S.I. and that the same may take it into kind consideration, I thank you once more on behalf of the Kalisyndicate for the assistance 'rendered."

When submitting the scheme outlined in the above letter for the consideration of the Council of the U. P. A. S. I., Mr. Anstead explained that the letter was the result of correspondence and frequent consultations with Mr. Friedrichsen lasting over the greater part of twelve months, and remarked that he had much satisfaction in laying it before the U.P.A.S.I.

" Mysore and Coorg have been chosen," observed the Scientific Officer, " because they are the only districts at present in which such Assistants are available and it is obvious that it is impossible for me to undertake such experiments unless there is a responsible officer in the district to take charge of them. Should other districts decide in the future to employ Scientific Assistants I have little doubt but that the Kalisyndikat would be willing to give them a similar grant.

" Should the districts of Mysore and Coorg in the first place and the U. P. A. S. I. finally decide to accept this grant, a scheme of experiments will be drawn up by myself in consultation with the Scientific Assistants, who would choose suitable places to carry them out with the consent of estate owners or managers. I suggest that these experiments should be designed to discover:

(1) the best form of Potash to use for Coffee in conjunction with available forms of Phosphate and Nitrogen

(2) the right quantities of Potash and other manures to apply

(3) what effect if any Potash salts may have upon the growth and latex yield of Ceará Rubber.

" The grant of £100 will be controlled by me and used to defray the cost of such experiments, and the cost of *artificial* manures. It is possible also that should the scheme take up too much of the time of the Scientific Assistants some portion of the grant would be used to employ in each district a native Assistant from one of the Agricultural Colleges whose special work would be to take charge of these experiments under the guidance and orders of the Scientific Assistants."

As is well known, Mr. Anstead considers that the manurial problem is the most important one as far as Coffee is concerned, and this generous offer of the Kalisyndikat should he thinks largely help to solve it. For this reason he would urgently recommend the Mysore and Croog Planters' Associations to adopt it and to ask the U. P. A. S. I. at the coming Annual Meeting to accept the grant on their behalf. Mr. Anstead would especially call attention to the paragraph in Mr. Friedrichsen's letter dealing with the reports on these experiments, from which it will be seen that the Scientific Department of the U. P. A. S. I. have full control over such reports and the first lien upon them. This is an important point which has carefully occupied his attention during the negotiations, and the paragraph in question was written after full discussion of the point involved,

The matter is obviously one that calls for special attention from the District Planters' Associations in Mysore and Coorg. They have been asked for an expression of their views. and if this is in favour of Mr. Friedrichsen's proposition, as Mr. Anstead hopes it will be, arrangements will doubtless be made for a full discussion of the subject at the next Annual Meeting of the U. P. A. S. I.

Scientific Officer's Papers.

CI.—HEVEA RUBBER SEED OIL.

Rubber planters may be interested in the following notes of some correspondence which has taken place between the Office of the U.P.A.S.I. and a London correspondent on the above subject. On 16th February this correspondent in the course of a letter remarked,—"You print an article from *Grenier's News* on Rubber Seed Oil. Dr. Rideal, who is an expert chemist and also interested in Rubber (Chairman of Cicely and Director of others) assures me that Pará Seed Oil has no value as a substitute for Linseed Oil."

To this I replied as follows:--

"The Imperial Institute are perhaps the highest authority on the uses of new products.

"In a letter to to the Planters' Association, Ceylon, Prof. W. R. Dunstan, the Chemist of the Imperial Institute, recently said:—

'"Investigations conducted at the Imperial Institute have shown that Pará Rubber Seed Oil is suitable for technical use as a substitute for Linseed oil and similar drying oils and technical trials with the oil conducted by manufacturers at the suggestion of the Imperial Institute have afforded conclusive confirmation of this view.'"

"This opinion is repeated with full information on the subject in the Bulletin of the Imperial Institute Vol. I 1903 p. 156, Vol. II 1904 p. 22 and Vol. VII 1909 p. 95 and again in a recent Bulletin it is repeated that the seeds contain about 42% of a liquid drying oil very similar in properties to linseed oil and capable like that oil of being used in the manufacture of paints and varnishes, rubber substitutes, oil cloth, soft soap, and other important industrial products."

"In view of these statements experiments are being conducted here to develop the oil industry on a large scale and so Dr. Rideal's statement comes as rather a shock. Before accepting it, and consequently modifying or stopping experimental work with this oil altogether, I should like to know whether the Imperial Institute have changed their views and also to know the views of the trade on the subject, and in fact exactly how Dr. Rideal supports his view which is in opposition to previously reported opinion."

This elicited the following reply from Dr. Rideal himself:—"I am afraid you have rather exaggerated what I told you with regard to Hevea seed oil, as I certainly did not say that the oil was not likely to be of any practical use. What I do say is that I do not agree with Dunstan in his opinion that Hevea seed oil is suitable for technical use as a substitute for Linseed oil and similar drying oils. It has not nearly such good drying properties as linseed oil as his own figures show in Vol. VII 1909 p. 95 of the Bulletin of the Imperial Institute. Not being a good drying oil, if used as a substitute for linseed oil it would make inferior paint and varnishes. What he means by rubber seed oil for rubber substitutes I cannot make out. Oil cloth is another thing which I do not think this oil would be good for as a quick drying oil is all important in this industry. Soft soap is the only thing in the list which it would be good for and if your friends in Bangalore like to grow Hevea in order to make soft soap out of the seed oil they are welcome to the suggestion."

This is very interesting and the next step is to find out if possible what sort of a price Hevea Seed Oil is likely to command in the European market during the next few years. Of course it does not interest the Rubber planter in the least what use is made of the oil so long as it commands a price and they can turn what is a waste product into money, so Dr. Rideal's somewhat puerile remark at the end of his reply was uncalled for.

While writing on this subject the following extract from the *Tropical Life*, may prove of interest:—

" After carefully studying the recent investigations made by the Imperial Institute and other experts regarding the possibilities of rubber-seed oil, we entered into correspondence with the Hull Oil Manufacturing Co., Ltd,, as we knew they were interested in the matter and had carried out fairly exhaustive experiments with seeds from various producing centres. As a result they have promised to do all they can to encourage the trade in the seeds (or rather the kernels, for it would never pay to ship the seeds with the shells on), and as they are exceptionally well placed to do so, being one of the pioneers of the soya-bean industry in England, we would advise those planters who have surplus supplies of seeds to dispose of to get into touch and collaborate with them. to develop the industry to mutual advantage. We say this because our Hull friends, having had over twenty-five years' experience in connection with the extraction of vegetable oils, are in an excellent position to manufacture and place on the market finished products of a high quality whether rubber-seed oils, meal or cake. As it is everything to make a good start, the knowledge that the first deliveries to be made to the public of rubber-seed products will be carefully prepared, should prove a great incentive to the planters to do their share in building up this promising new industry and make them ready and anxious to get into touch with such a firm.

" From all accounts, although the quantity of seed available will not be on a very large scale either this year or in 1913, still many of the large estates have already realized the possibilities of increased returns from the trees through the large accumulations of seeds they see around them, and which for the most part at present, simply remain on the ground to rot, the supply already exceeding the demand for planting elsewhere.

" As regards the yield, some of the estates report that their (Hevea) trees in full bearing will produce about 8 tons of nuts to the 100 acres. At 200 trees to the acre, this would work out at under 1 lb. per tree (17,920 lbs. to 20,000 trees). Allowing however, 1 lb. of seed per tree, since Messrs. Figgis & Co. in their annual report (see January issue, p. 14) speak of 40,000,000 trees as coming into bearing in Malaya alone, this centre would thus yield 18,000 to 20,000 tons of seeds, whilst on the basis of the yield given by the planters of 8 tons of seed per 100 acres, the 350,000 acres said to be planted in Malaya in 1911 would give 28,000 tons again when all the trees come into full bearing. Besides these, we have 40.000 acres mentioned in the same report as being under rubber in Ceylon, and the centres other than Malaya, which should give another 40,000 tons; and no doubt the Brazilian seringuieros, even away in the high forests, would soon add their share to the supplies, while the forests that are being cleared to facilitate ingress and egress to the self-sown trees, as well as the rapidly increasing plantation areas, which in four years' time are expected to contain 6,000,000 trees, would also send supplies.

" What will probably cause the planter and estrada owner alike to utilize the rubber seeds and other by-products on their estates, will be the need, when the price of rubber drops as the production increases, to press everything into their service in order to swell the profits, whilst the same brokers who sell the rubber can also arrange to sell the seeds, thereby increasing their brokerage as well, Others who wait to see how this pioneer work prospers, will find if they are not careful that they have got left out in the cold.

"The cost of collection, decortication and transport should not, and will not, we are sure, prove excessive when the trade is well established. With regard to the transport, whether down to the coast or across the sea, since the rubber already there has to be sent, the same means of transport could be used for the seeds.

"The shells must be removed before the seeds are exported, for since they are no use to the oil mills, and as they represent at least 50 per cent. of the total weight of the seed, to ship the seeds complete would be needlessly costly, in fact extremely wasteful

"Decorticating machines suitable for the work are not expensive; probably as with palm nuts, the cracking can be done expediously and cheaply by centrifugal force, and in any case the decortication could be done by native labour under white supervision, and the cost should be cheaper abroad than over here. Again, the fact that the seeds must be dried before shipment almost renders decortication to be obligatory, and the combined saving weight and measurement, by removing the shells and surplus moisture would enable any shipper exporting properly dried kernels only, to undersell those shipping the seeds as collected. Bridge's rotary driyer or similar machines would do the work cheaply and quickly, using the shell as fuel, unless the shell also is found to contain a by-product that pays to extract.

"The same as with copra, to place the industry on a really commercial basis, parcels of at least 100 tons should be shipped at a time. Smaller parcels do not meet with approval from the mills on this side and thus not attracting the large buyers, the competition on the market would be reduced, and lower prices realized.

"Many attempts have been made to arrive at a reliable estimate as to the number of Hevea seeds it would take to make a ton of decorticated kernels. Also what the cost f. o. b, at the producing centre would be, and what price can be looked for on this side per ton of kernels. We weighed some old seeds we had by us in the office, they went 40 to the ¼ lb. or allowing 50 per cent. for the weight of the shells, 320 kernels to the lb. or something under ¾ million kernels to the ton, but the Hull Oil Manufacturing Co., Ltd., tell us they have received samples of seeds from practically every centre, and find that, judging by these, no two districts produce rubber seeds exactly alike. Taken as a whole, the estimated value of Hevea kernels (*i.e.*, decorticated seeds) on April 12, 1912, was from £9 to £12 per ton, according to quality, bags included, not weight, c. i. f. any United Kingdom port, less the usual 2½ per cent. discount."

RUDOLPH D. ANSTEAD,
Planting Expert.

COFFEE-GROWING IN MADAGASCAR.

Coffee-growing in Madagascar is beginning to take an important place amongst the agricultural industries of the island. In the Mananjary district there are no fewer than twenty coffee-growing estates, containing at least 700,000 plants, producing at the present time about 120 tons annually. It is estimated that the yield from these plantations will in a few years' time be increased to at least 500 tons. The Liberian variety of coffee is chiefly grown in Madagascar, but many planters arei ntroducing a qaulity resembling East Indian, with small berries and thin husks. Madagascar coffee is beginning to find a market in France.

RUBBER.

Fertilizers in Rubber Cultivation.

Experience has proved the necessity of a certain amount of fertilization, as a condition of successfully cultivating rubber trees in tropical climates, this being particularly the case with *Hevea*. This fact has commenced to interest tropical planters, more especially those of the Federated Malay States, Ceylon and the Dutch Indies, who are trying to derive advantage from the more or less exact data now available on the subject.

As pointed out by a writer in " Le Caoutchouc et La Gutta-Percha," it has become more and more evident that certain chemical products exercise a favourable influence, not only upon the development of rubber vegetation, but also upon the yield of latex. On this point, preliminary experiments made in British India have proved that the application of nitrate of soda increases the flow of latex and the proportion of rubber produced.

In the course of experiments at Hawaii (Keanoe) with *Manihot* trees, to which Chilian nitrate had been applied at a depth of 4 inches, those to which ¼ pound had been used yielded from 2 to 3 ounces. The action of the fertilizer was noticeable after 48 hours.

As to *Castilloa*, European theoretical experiments have demonstrated the probable value for the purpose in question of salts of lime and potash and of azoted compounds. The opinion has, however, been expressed that the use of potassic fertilizers encourages the development of vegetable parasites; this subsidiary question needing consideration. Lime, it is added, seems to be at present justly attracting the particular attention of planters in the East.

While the results obtained in the Federated Malay States by the use of lime are of interest, they are not, it is believed, of universal application. Where it is impossible to procure a sufficiency of lime at an advantageous price, it is considered questionable whether the attempt to cultivate *Hevea* is advisable.

The soils in the English Asiatic possessions are generally deficient in lime, phosphates and potash, but often contain quantities of azote, particularly in situations formerly covered with virgin forests.

Based on the above facts, there follows an interesting disquisition of the action of fertilizers on turfy, argillaceous and sandy soils; concluding with the following remarks:—

" There are consequently arguments for and against the use of fertilizers, either in the form of chemicals, or as a vegetable covering. It is for the planter, after studying the different methods of cultivation, to ascertain for himself, in each particular case what kind of fertilizing is advisable. . . . The question is a very complex one and does not admit of a solution applicable to all cases."—*India Rubber World.*

A Million Acres of Plantation Rubber.

While estimates affecting other parts of the world are necessarily more or less approximate, the figures available with regard to Asiatic rubber plantations are sufficiently exact to afford a basis of calculation.

In a recent issue the "Revue Internationale," after discussing the various items of which it is composed, put forward an estimate of the surface planted in Asia with rubber, of 826,541 acres.

By a detailed comparison of this estimate with the recent figures of Mr. D. Milton Figart, United States Vice-Consul General at Singapore (published by *The India Rubber World*, January 1, 1912, p. 161), the following results are shown:—

ESTIMATED RUBBER ACREAGES, 1910.

	Revue Internationale.	Mr. Figart.
Malay	362,853	362,853
Ceylon	238,822	241,885
Java	106,664	...
Sumatra	80,000	...
Netherlands India (Java and Sumatra)	...	150,000
India and Burma	26,202	43,525
Borneo	12,000	...
Cochin China	...	11,000
Total	826,541	809,263

The first estimate, while higher than others which have recently appeared, is considered by the writer of the article to fall short of the exact conditions.

With regard to Africa, it is added that the cultivation of rubber is extending, there being in the German East and West African colonies and in the French colonies several thousand hectares (of 2·47 acres) planted with *Funtumia*, *Ceard* and *Hevea*, part of the trees being in a productive condition.

In Mexico there are, it is stated, 100,000 acres planted in rubber. The acreage in British Guiana is stated to be 1,700 acres, of which 1,000 are in *Hevea* alone. In Dutch Guiana there are said to be 800 acres in *Hevea Brasiliensis*, 17 plantations being engaged in the cultivation of this variety. Trinidad and Tobago have, it is added, 2,300 acres under cultivation, planted with about 85 per cent. of *Castilloa*, 11 per cent. *Hevea*, and 4 per cent. of *Funtumia*.

Taking as a basis the French estimate for Asia quoted above, and adding to it the figures given for the other parts of the world, the result would be approximately as follows:—

	Acres.
Asia	826.541
Africa (say)	10,000
Mexico, etc., (say)	100.000
British Guiana	1,700
Dutch Guiana	800
Trinidad and Tobago	2,300
Total	941,341

These figures applying to 1910 and being, moreover, avowedly incomplete, it is evident that by allowing for 1911 even a normal amount of new planting, the "million acres in plantation rubber" which has been spoken of has possibly been already exceeded.

In its concluding sentence the article thus deals with the general question of plantation *vs.* wild rubber:

"Plantations may therefore seriously compete with the production of wild rubber; but the contest, while becoming keen, is not destined to cause wild rubber to disappear, if its production is rationally conducted, if the methods of extraction correspond with the physiology of the trees, and if . . . . replanting takes place under conditions of natural vegetable."—*India Rubber World.*

Rubber Cultivation in Mexico.

As is pointed out in *La Quinzaine Coloniale* for July 10, 1911, the rubber produced in Mexico is mainly of two kinds: Guayule, from *Parthenium argentatum*, and the product of *Castilloa clastica.*

It is stated further that the total export amounts to 5,532 tons valued at over £1,600,000. Of this quantity 407 tons was from Castilloa, 163 tons out of this having been obtained from cultivated trees. It is estimated that the total area of the Castilloa plantations is about 90,000 acres, and in these rubber is being obtained at present from only a small proportion of the trees.

Although about 93 per cent. of the total shipments of rubber was Guayule, the proportion is bound to become greatly lessened on account of the decreasing numbers of the wild plants and the fact that those raised in plantations have not given the yields that were expected from them.

Rubber Trees in Times of Drought.

An exceedingly interesting demonstration has been given during the past season in the West Indies and the Guianas, of the conduct of rubber trees under conditions of severe drought. It cannot be claimed that this has been a free demonstration. for, as a matter of fact, it has been in a general way extremely expensive, but it has afforded much valuable information to rubber planters.

There has been a very severe drought, continuing for many months, throughout all the Southern group of the West Indian Islands, and covering the Northern part of the continent of South America. Some idea of its severity may be gained from the fact that for the first three months of this year the rainfall in British Guiana was less than 2½ inches, as compared with over 20 inches for the same period last year. In the islands the cacao and banana crops have been practically ruined ; in fact all vegetation seems to have suffered severely—with the one exception of rubber. The rubber trees in Trinidad and the adjacent islands appear to have gone through the drought in practically their normal condition, giving fully, or at least approximately, the same yield as in former years. In Trinidad, for instance, there are two large trees, planted many years ago, which for some time have produced an annual yield of ten pounds each ; they were ready this year, each with its ten pounds of rubber, just as if the rainfall had been frequent and copious.

The exports of balata from British Guiana for the first three months of the year dropped to 23,000 pounds from nearly 73,000 pounds, the production for the same three months last year. This marked shrinkage was not because of the decreased yield of the trees, but almost wholly because the drying up of the rivers—the only means of communication between the balata forests and the export point—had rendered it impossible in many instances, and difficult in all, to send the usual expeditions to the balata camps, or to bring the rubber down to port after it had been secured.

While the meagreness of the rainfall during the last eight months has played havoc with many of the plantation activities in the West Indies and adjacent shores of South America, it certainly has given strong encouragement to rubber planters in that section, for it has proved, that in rubber, they have a tree that will weather, unimpaired in condition and in yield, a season of marked disaster to other planting industries.—*India Rubber World.*

Rubber Industry in Sumatra.

The following information is from the report by the British Vice-Consul at Medan (Mr. A. L. Mathewson) on the trade of the East Coast of Sumatra in 1911, which will shortly be issued:—

The cultivation of plantation rubber is already one of the most important industries in Sumatra and bids fair to be a factor of very considerable importance in future in furthering the development of the east coast of the island. It is calculated that approximately five-eighths of the whole capital invested is British. One or two hitherto unexploited districts have been opened up, and there is little doubt that even more would have been done in this direction had better means of communication by road and rail been available. A large number of companies intend to plant little or nothing further in 1912, but several are preparing to plant considerable areas.

Reliable statistics as to the amount of capital invested in the rubber industry in Sumatra and the area under plantation rubber are unobtainable. Returns show at the end of 1911 approximately 130,000 acres planted, of which over 125,000 acres are under *Hevea Brasiliensis*. It has been estimated that at the end of 1911 there was 50 British rubber companies working in Sumatra, with an issued £6,200,000. The capital invested in the cultivation of rubber on the east coast of Sumatra is approximately—British, £5,000,000, Dutch £3,000,000, German, £80,000, Belgian, £62,000, and Swedish, £20,000, a total of £8,162,000.

In the Philippines,

"In January, 1911. reported the *Philippine Agricultural Review* of this year, about 120,000 Pará seeds were obtained from Singapore. The larger portion of these were planted at the Singalong experiment station, the remainder being sent to La Granja Modelo and to the quarantine station at Iloilo. About 35,000 plants plants were obtained from the lot planted at Singalong, about 1,200 at La Granja Modelo, and 750 at Iloilo, The germination of the seed approximately worked out at 30 per cent. The seedlings at Singalong are being sold at the rate of P. 3 per 100 (1 Philippino= 2*s*.), so it will be of interest to know how those importing stumps will fare compared with those using the Singalong seedlings. At La Granja Modelo and Iloilo the seedlings are, or were, being given away, so planters were unlikely to buy cheaper than that; at the same time some maintain, elsewhere than in the Philippines that stumps, if not toll old, often catch hold of the ground more quickly than seedlings of equal age planted at the same time. How successful stumps may be on oversea voyages when properly cared for is shown by the results obtained by Mr. Stuart R. Cope, who has his consignments regularly watered on the voyage. "I am informed," Mr. Herbert Wright tells us in the Fourth Edition of his "Hevea Brasiliensis" just issued (p.480), "that in the case of a consignment of 50,000 sent from Ceylon to the Cameroons, the actual delivery 'live and in good condition' was 43,726."

The old Ceará trees at La-Granja Modelo were tapped, but no returns are given as to the yield.

Amsterdam Market.

The results obtained during 1911 show a considerable advance on previous years, and it is expected that the arrivals on this market will increase very rapidly during the next few years as the plantations in the colonies attain full production. The total arrivals of rubber of all kinds at Amsterdam amounted to 240 tons, of which 146 tons were *Hevea* and *Ficus* from Java, the remainder being miscellaneous kinds. The prices during 1911 varied from 3fl. 50c, (5*s*. 10*d*.) to 2fl. 45c. (4*s*. 1*d*.) for *Hevea*, from 3fl. 45c. (5*s*. 9*d*.) to 1fl. 80c. (3*s*.) for *Ficus*, and 2fl. 65c. (4*s*. 5*d*.) to 1fl. 40c. (2*s*. 4*d*.) for *Castilloa* per Dutch lb.

TEA.

The American Tea Industry.

(FROM *The San Francisco Grocer.*)

" American Tea is by no means an impossible product of the future," says Secretary Wilson of the Department of Agriculture, he being of the opinion that the obstacles in the way of this achievement may finally be overcome by persistent effort.

MODERN TEA MACHINERY INDUSTRY.

The work in Tea culture carried on at Summerville, S. C., has continued to give favourable results, and although this season was somewhat discouraging from the standpoint of rainfall, the year has been satisfactory. A machine to prune the plants either in the flat or convex type of cut has done successful work saving expensive hand-labour and Tea-picking apparatus is now receiving attention, and some small samples of machine-picked Tea have been obtained. When these two operations are successfully done by machines, the labour problem in the American Tea-raising industry will have been solved.

Of the world's annual consumption, exclusive of the very large local use in China (the extent of which is unknown), amounting to about 700,000,000 lbs., 150,000,000 lbs. is produced in China, and the recent trouble there is bound to interfere to a great extent with this industry, and will, in all probability, bring about a re-adjustment of the Tea trade of the world.

HOME INDUSTRY MAY PROMOTE CONSUMPTION.

The people of the United States,although considered a Coffee-drinking nation, consume annually upwards of 100,000,000 lbs. of Tea, for which $16,000,000 or more are paid. The imports of Tea for every fifth year from 1853 to 1908, inclusive, show a general increase in the quantity of Tea imported, and it is possible by establishing a Tea industry at home, to greatly increase the consumption, as has been done in Great Britain since Tea became a staple of her Indian Colonies.

The Secretary asserts that " The ability of the Tea plant to adapt itself to a wide range of conditions is exceeded only by wheat, and that the climate of the Southern States is in general fairly suited to its cultivation; for, although the rainfall is much less than in most of the Tea-producing countries, the average annual temperature is lower, hence there is less evaporation, and therefore less rainfall is needed.

" For its successful growth the Tea plant requires a deep, fertile, well-drained, friable and easily penetrable loam containing a large amount of well-decomposed organic matter, such as is found in much of the Southern territory.

" In establishing a Tea plantation there is nothing more important than the selection of the seed, especially when imported. As about one only in every three shipments arrives in good germinating condition, the cost of importation assumes a high figure. When gardens become general in this country the expense of importation will become unnecessary, and even now Tea seed gathered from Pinehurst S. C., costs less than $5.00 per 100 lbs. while imported seed costs $50.00 per 100 lbs."—*Tea and Coffee Trade Journal.*

AMSTERDAM MARKET.

The arrivals of Java tea at Amsterdam were again considerably less during than in the previous year, *viz.*, 1909. 174,399 cases; 1910. 157,631, 1911, 136,790.

The average price during 1911 was 9*d.* per Dutch lb.

REPORTS OF COMPANIES.

Poonmudi Tea and Rubber Co.

The Directors of the Poonmudi Tea and Rubber Company, in their second annual report, state that, after providing for general expenses, London office expenses, superintendent's commission, £325 19*s.* 9*d.* for depreciation, and writing £381 10*s.* 4*d.* off preliminary and formation expenses, the net profit for the year amounts to £8,073 8*s.* 6*d.* To this has been added the sum of 14*s.* 6*d.* During the year an interim dividend of 2½ per cent. was paid on the ordinary shares, and the Directors now propose to pay a final dividend of 10 per cent. (making 12½ per cent. for the year), to place £1,000 to reserve, and to carry forword the balance of £474 7*s.* to the next account. The crops amounted to 802,278 lbs. tea (against 766,658 lbs. last year), which was produced at a cost of 4'02*d.* and realised 6'96*d.* per lb. and 6'716 lb. rubber, which realised 4*s.* 4'27*d.* per lb. for the portion sold. The December report gives a total of 15,217 rubber trees, which are being tapped. The estimate for the current season is for a crop of 780,000 lbs. of tea and 15,000 lbs. of rubber, and provides for the up-keep of the present clearings, in addition to general expenditure, installation of a new engine and new rubber machinery to deal with the increasing crop. 197 acres of land, as foreshadowed in last year's report, have been acquired during the year, and a further 118 acres have been purchased from the Government. The Board have to report with great regret the death of their colleague, Mr. David W. T. Valentine, which occurred in February last.

Rani Travancore Rubber Co.

The Directors of the Rani Travancore Rubber Company, Ltd., in their annual report, state that the receipts from sale of rubber were as under:—Rubber sold in London, 190,514 lbs., £43,975 5s. 7d.; rubber sold in Ceylon, 2,718 lbs., £585 17*s.* 8*d.* Transfer fees and interest amounted to £190 19*s.* 2*d.*, making £44,752 2*s.* 5*d.* in all. Expenditure in Ceylon and London, including directors' fees, London charges, income tax, etc., amounted to £18,211 18*s.* 3*d.*, leaving the profit for the year £26,540 4*s.* 2*d.*, to which must be added the balance brought forward from last year £4,486 6*s.* 7*d.*, making a total of £31,026 10*s.* 9*d.* £5,000 has been transferred to reserve account, and £2,000 to depreciation account, leaving a balance of £24,026 10*s.* 9*d.*, out of which it is proposed to pay a dividend of 7 per cent. for the year 1911 (less income tax), and to carry forward to next year a balance of £5,733 16*s.* 5*d.* The crop of rubber for the year 1911 was 193,232 lbs., against 125,000 lbs. estimated in the prospectus. This crop was obtained from approximately 213,440 trees. The apportioned cost of the rubber, f.o.b. Colombo, was is. 7.61*d.* per lb. A further area of 1,116, 140 acres is being planted up in rubber this year, distributed as follows:—Vellanadi 75 acres, Perinaad 65 acres. The factories on Sittar and Shaliacary were enlarged last year, and are being further added to this year. A factory was built on Vellanadi during the past year, and the erection of the Perinaad factory is now being proceeded with. The rubber estimate for the current season is 325,000 lbs. The Directors have made the following contracts for forward delivery of first latex rubber, *viz.*:—24 tons, delivery July to December, 1912, at 4*s.* 11¼*d.* per lb.; 18 tons, delivery August to December, 1912, at 5*s.* 5*d.* per lb.; 24 tons, delivery January to December, 1913, at 4*s.* 9d. per lb.

Kanan Devan Hills Produce Co.

The Directors of the Kanan Devan Hills Produce Company, in their annual report, state that the credit balance from last year was £7,583 8*s.* 11*d.* The profit for the year is £109,664 6*s.* 6*d.*, less interest, discount on bills, etc., and commission on profits, £13.203 12*s.* There has been written off Block Expenditure, Suspense Account £15,000; expenses in connection with issue of Cumulative Preference shares in 1911, £3,470 17*s.* 2*d.*; and a dividend of 6 per cent. on the Cumulative Preference shares was paid on December 15th, 1911, £27,269 17*s.* 4*d.*, leaving a balance of £58,303 8*s.* 11*d.*, out of which the directors propose to pay, on June 7th, a dividend of 7 per cent. on the ordinary shares, and to carry forward to next year, £5,803 8*s.* 11*d.* The tea crop amounted to 8,423,331 lbs., against a yield of 7,974,308 lbs. in 1910. The average price obtained, *viz.*, 8·45*d.*, is ·51*d.* over that realised for the previous season's crop. The planted area of the Company's estates is now 19,544 acres, *viz.*, 17,632 acres of tea, 50 acres of coffee (interplanted with tea), 640 acres of cinchona, 680 acres of rubber 429 acres of sisal, and 113 acres of camphor. It is proposed to plant out 718 acres of tea and 100 acres of rubber in Travancore during the current season. The estimates of crops for 1912 are: tea 8,919,000 lbs., coffee 200 cwt., cinchona 278,400 lbs., and rubber 4,000 lbs.

Anglo-American Direct Tea Trading Co.

The Directors of the Anglo-American Direct Tea Trading Company, Ltd., in their annual report, state that the credit balance from last year was £2,092 5*s.* 8*d.* The profit for the year is £108,929 16*s.* 3*d.*, less interest, discount on bills, etc., and commission on profits, £8,074 6*s.* 3*d.* There has been written off Block Expenditure, Suspense Account, £8,000; dividend of 6 per cent. on the Cumulative Preference shares, paid on December 22nd, 1911, £16,542 12*s.*; leaving a balance of £78,405 3*s.* 8*d.*, out of which the Directors propose to pay, on May 31st, a dividend of 12 per cent. on the ordinary shares, and to carry forward to next year £2,284 7*s.* 8*d.* The crop of tea was 6,213,468 lbs., against a yield in 1910 of 5,932,461 lbs.; and of rubber 154,332 lbs. against 90, 827 lbs. The crop of cocoa was 883 cwt., of coffee 4,229 cwt., and of cardamoms 48,924 lbs. The average price secured for the tea crop is 8·27*d.* per lb., against 7·78*d.* per lb. in 1910; and for rubber 5*s.* 8*d.* per lb., against 6*s.* 4*d.* per lb. The area under plant is now 17,094 acres, consisting of 12,099 acres of tea (about 1,700 acres of the area in Ceylon being interplanted with Pará rubber); 1,717 acres of coffee; 1,255 acres of Pará rubber in separate clearings in Ceylon, and 250 acres in the Anamallai Hills of South India; 907 acres of cardamoms; 741 acres of cocoa; 50 acres of cinchona; 65 acres of camphor; and 10 acres of cocoanuts. The profit obtained from the Company's distributing businesses was satisfactory. The estimates of crops for 1912 are: Tea 6,485,500 lbs., cocoa 2,500 cwt., coffee 7,620 cwt., cardamoms 31,400 lbs., and rubber 210,000 lbs. 70,000 lbs. of rubber were sold forward for delivery during the current year at an average of 5*s.* 6¼*d.* per lb., and 55,000 lbs. have been sold for delivery during 1913 at 4*s.* 7½*d.* per lb.

Stagbrook Rubber and Tea.

The directors report for the year 1912 that the net profit earned after writing off a further £500 to depreciation on machinery and buildings, and placing £1,000 to reserve fund, was £6,886. To this must be added the sum of £1,015 carried forward from last year, making a total of £7,901. Out of this the directors recommend the payment of a dividend at the rate of 10 per cent. per annum on the paid-up capital, which will absorb £6,000, leaving a balance of £1,901 to be carried forward to next year; 433,221 lbs. of tea and 30,000 lbs. of rubber were harvested during the year, against 450,551 lbs. of tea and 10,501 lbs. of rubber last year. The tea sold at an average price in London of 8·37*d.* per lb., and the rubber 4*s.* 10·28*d.* per lb., as against 7·19*d.* per lb. and 5*s.* 0·74*d.* per lb., respectively, last year. The estimated crops for the current season are: 500,000 lbs. of tea and 62,000 lbs. of rubber.

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A Still for Camphor.

In the *Planters' Chronicle*, Vol. VII, No. 15, p. 237 a correspondent asked for drawings of a camphor still. Mr. L. Lewton-Brain, the Director of Agriculture in the Federated Malay States, in reply to a letter the Scientific Officer wrote to him on the subject, has most kindly sent a Bulletin recently published by his Department which contains an account of recent experiments in Malay with the distillation of Camphor, together with a description of a still designed for the purpose and drawings. Unfortunately it is not possible to reproduce these drawings in the *Chronicle*, but a reprint of a lengthy extract from the Bulletin describing the still and the results obtained with it is commenced in this number, and, Mr. Anstead will be happy to forward tracings of the drawings to any planter who wishes to obtain them.

CAMPHOR FROM CINNAMOMUM CAMPHORA.

Preliminary Distillation Experiments.

PREPARATION OF MATERIALS FOR DISTILLATION.—The first distillations, which were on a small scale only, were carried out in 1909 with prunings from five year old trees. The small stems and leaves were cut into pieces about an inch long by means of a parang (native knife). On a large scale this cutting could be done more economically in a special machine similar to a chaff cutting machine. Experiments were made with the following material:—(1) Whole leaves, (2) Leaves cut into small pieces, (3) Air-dried leaves, (4) Mouldy leaves, (5) Stems cut into small pieces.

DESCRIPTION OF SMALL APPARATUS.—The initial experiments were carried out in a copper still of a capacity of 1½ gallons (=6·8 litres) capable of holding 1 pound (=680 grammes) of leaves or about 4 pounds (=1814 grammes) of small stems. An ordinary glass "Liebig" condenser was used to cool the camphor and oil. Steam was generated in a separate vessel and passed into the copper still through a glass connecting tube.

YIELDS.—In these initial experiments 11·8 kilogrammes (=26 pounds) of prunings, consisting of 64·9 per cent. leaves and 35·1 per cent. small stems, were obtained from the Experimental Plantations, Batu Tiga, Selangor, being part of the prunings from a five year old tree.

The following results were obtained from different distillations :—

	Weight of material (grammes).	Weight after air-drying (grammes.)	Description of material.	Yield (grammes).	Yield on original material per cent.	Yield on dried material per cent.
1	400	...	Cut leaves	4·89	1·22	...
2	500	...	do	5·86	1·17	...
3	1,500	...	Small stems	6·75	0·45	...
4	500	...	Leaves and stems	6·25	1·25	...
5	1,000	...	Small stems	6·00	0·06	...
6	500	...	Mouldy leaves	6·26	1·25	...
7	500	300	Leaves	6·27	1·25	2·06
8	500	...	Mouldy leaves	7·35	1·47	...
9	750	468	Air-dried leaves	8 27	1·10	1·26
10	500	240	do	5·83	1 16	2·40
11	500	270	Air-dried mouldy leaves	7·71	1·54	2·80
12	500	285	Air-dried leaves	7·53	1·15	2·60
13	500	...	Leaves and stems	7·92	1·58	...

In all of the above distillations, the distillate consisted chiefly of camphor with very little oil.

DISTILLATION OF CAMPHOR ON A COMMERCIAL SCALE.

The initial experiments were carried out, as described above, in a small copper still, the camphor and oil being condensed in a glass "Liebig" condenser. In this way it was comparatively easy to ascertain when all the camphor and oil had been completely distilled from the material. Subsequent experiments on a larger scale were carried out during 1909 with the same apparatus as is now being used with the exception of the condenser.

DESCRIPTION OF LARGE APPARATUS.—The apparatus, originally employed for distillation on a large scale, consisted of the following :—*Vide* Figs. 1—5).

(*a*) *Boiler.*—(*Vide* Fig. 1 A and Fig. 3). Horizontal cylindrical boiler, fitted with water level, safety valve, exit pipe for steam, and opening for filling. The dimensions of the boiler were as follows :—

Length	2 ft. 6 inches.
Diameter	1 ft. 9 inches.

The boiler was erected on a brick and cement foundation and supported by stout iron bars. Heat was applied by means of a wood fire on an open hearth beneath.

(*b*) ***Still.***—(Vide Fig. 1 B). The still consisted of a vertical cylindrical vessel of cast iron with a flange at the top. A perforated iron plate resting on a ridge about 5 inches from the bottom supported the camphor prunings. The exit steam pipe from the boiler was connected to the still below the perforated plate below the perforated plate a tap was supplied to the still to draw off from time to time any condensed steam so that the material in the still did not lie in water.

The still was closed on top by a circular iron plate resting on the flange, with an asbestos ring to render the apparatus steam-tight. This plate was screwed down with thumb screws attached to swinging bolts which are fixed to the side of the still. The dimensions of the still were as follows :—

Height of Steel	2 feet 9 inches.
Diameter of Still...	1 foot 9 inches.
Capacity in terms of green camphor leaves ...	60 pounds.
Capacity in terms of camphor wood ..	100 pounds.
Capacity in terms of pruning (leaves and small twigs)	90 pounds.

(*c*) ***Condenser.***—***Vide*** Fig. 5). The condenser used in the experiments carried out on a large scale in 1909, was a "Liebig" condenser with four tubes, round which cold water circulated. It consisted of a vertical cylinder of iron with a chamber at both ends, connected together by four copper tubes. Cold water entered at the bottom and flowed away at the top. The bottom and top of the condenser were closed by iron plates resting on flanges fixed by means of screws, and rendered steam tight by asbestos rings, so that the plates could be detached in order to clean out the condenser.

A short bent copper tube from the bottom annular space carried off the condensed steam, camphor and oil, which could be collected in any suitable vessel. The dimensions of the condenser were as follows:—

Length	... 2 feet.
Diameter	... 9 inches.
Length of condensing tubes ...	... 1 foot 9 inches.
Diameter of condensing tubes...	... 1 inch.

An iron pipe of 1 inch diameter connected the still with the condenser. The whole of the above plant with the exception of the copper condensing tubes was made of iron. The disadvantages attached to the above apparatus may be detailed as follows:—

(*a*). An iron condenser discolours the camphor. A copper condenser, which would be more expensive, would obviate this.

(*b*). A tube condenser in the case of a solid distillation product like camphor is easily blocked as a large portion of the camphor condenses in the tubes. It is also difficult to obtain a special screw-cleaner that exactly fits the tubes. A tube condenser would, however, be useless for destillations on a large scale.

(*c*) In the case of the still, time is wasted in discharging and recharging; this could be remedied by having a lateral opening above the perforated plate which could be closed by a door with asbestos packing or preferably a highed bottom to the still, the still being raised off the ground. In a large still the settling of the leaves and twigs especially after the steam has thoroughly soaked them, would tend to create pressure inside by blocking the passage of steam. This could be remedied by using a series of perforated plates, a definite quantity of material resting on each. A preferable improvement and one which would simplify discharging would be to have a metal cage resting on a ridge near the bottom which could be lifted by means of a small crane or other mechanical device.

NEW STILL.—It was found in using this apparatus, that the boiler was much too large in proportion to the remainder of the apparatus and that a still of four or five times the capacity given above could be employed with a boiler of the above capacity. A still capable of holding about 400 lbs. of pruning has recently been constructed (Vide Fig, 2) and found to give very satisfactory results.

YIELDS.—In the preliminary experiments carried out in the above apparatus a whole tree (5 years old) from the Batu Tiga Experimental Plantations was used. It consisted of:—

Leaves weighing 12½ lbs. representing 7·5 per cent. of the whole plant.

Stems (less than ½ inch diameter) weighing 30 lbs. representing 18·2 per cent. of the whole plant.

Woody stems (over ½ inch diameter) weighing 93 lbs. representing 56·3 per cent. of the whole plant.

Roots weighing 29½ lbs. representing 18·0 per cent. of the whole plant.

Separate distillations were made of the leaves, stems (under ½ inch diameter), wood and roots, with the following results:—

Weight of material.	Description of material.	Yield of camphor and oil in ozs.	Yield per cent.
12·5 lbs.	Leaves	2·00	1·00
30·0 ,,	Stems (under ½ inch diameter)	1·07	0·22
93·0 ,,	Woody stems (over ½ inch diameter)	9·08	0·61
29·5 ,,	Roots	5·07	1·10

Except in the case of the roots, the distillate consisted principally of solid camphor with very little oil. The distillate from the roots consisted entirely of an oil which appears to be quite distinct from the oil obtained from the leaves and wood, having a lemon-camphor odour.

Most of the camphor was of a dirty brown colour, due to contamination with iron rust, although that scraped from the copper tubes of the condenser was nearly white. The discoloured camphor could easily be rendered white by sublimation.

PERIOD OF DISTILLATION.

In the preliminary experiments carried out with the glass condenser, it was found that all the camphor and oil distilled over within three hours, the greater portion distilling over within half an hour after steam commenced to pass through the material.

In the later experiments, with the large apparatus, the distillations were carried out in each case for longer periods in order to ascertain whether similar results would be obtained.

In each case the camphor and oil from three hour distillations were collected separately with the following results:—

(*a*) *Distillation of leaves.*

1st period of	3 hours.	Camphor and oil.	1·0 per cent.
2nd do	3 hours.	do	Trace.
3rd do	3 hours.	do	Nil.

(*b*) *Distillation of stems* (under ½ inch diameter).

1st period of	3 hours.	Camphor and oil.	0·20 per cent.
2nd do	3 hours.	do	0·02 do
3rd do	3 hours.	do	Nil.

(*c*) *Distillation of wood* (over ½ inch diameter).

1st period of	3 hours.	Camphor and oil.	0·56 per cent.
2nd do	3 hours.	do	0·035 do
3rd do	3 hours.	do	0·022 do

(*d*) *Distillation of roots.*

1st period of	3 hours.	Camphor and oil.	0·90 per cent.
2nd do	3 hours.	do	0·20 do
3rd do	3 hours.	do	Trace.

CONCLUSIONS.

The results of these initial experiments lead to the following conclusions:

1. A yield of about 1 per cent. of camphor and oil (consisting chiefly of camphor) may be obtained from prunings from 5 year old plants and probably from younger plants.

2. The distillation period should not exceed three hours in the case of prunings, *i.e.*, leaves and young branches.

3. A much larger proportion of camphor is obtained from the leaves that from the branches and the yield from small twigs is greater than that from older branches in trees of this age.

4. Air drying of the leaves has no detrimental effect on the yield, but loss would probably result if the leaves were exposed to direct tropical sunlight.

(*To be continued.*)

TEA.

Tea Trade of China.

PROSPECTS FOR THIS YEAR'S SUPPLIES.

The Board of Trade have received reports, through the Foreign Office, from H. M. Consular Officers at Shanghai, Hankow, Kiukiang and Foochow, with regard to the probable effect of the revolutionary disturbances upon the tea trade of China this season. These reports may be summarised as follows:—

It is at present too early to predict the amount of the new season's total crop; but so far as is known, the tea trees in the tea-growing districts have not been damaged, and there is no reason to anticipate a shortage in the crop itself. It is feared, however, that there may be a serious shortage in the supplies available for export, owing to financial difficulties. The financing of the crop is usually arranged by foreign firms through native (Chinese) banks; but, owing to the almost complete disappearance of these banks, especially at Hankow and at Shanghai, it will probably be necessary for the foreign firms to finance the growers up-country themselves.

There is, moreover, owing to the disturbances a feeling of considerable uncertainty as to whether money sent to the growers will actually reach its destination; it is understood that certain firms have applied for military guards to escort the convoys carrying money to the tea-growing districts.

It is consequently anticipated that the supplies for export will be late in coming forward; and that there will be a shortage in the total supply available for export variously estimated at from 20 to 35, 40 or even 50 per cent. High prices are expected to rule as the result of the shortage. It is expected that the so-called "first crop" teas will be particularly affected.

In this connection it may be mentioned that the "brick" tea trade in the Kiangsi district was seriously interfered with last year; there was a delay of nearly three months in starting work in the brick tea factories, and prices advanced considerably. Foreign merchants engaged in the brick tea trade (which is mainly carried on with Russia) anticipate a very short supply again this year.

Netherlands East Indies:

The following information is from the report by H. M. Consul at Batavia (Mr. J. W. Stewart) on the trade of Java, Sumatra, &c., in 1911:—

Tea Exports from Java.—The exports of Java tea during the years 1910 and 1911 were as follows:—

To	1910.	1911.
	lbs.	lbs.
Netherlands	18,804,300	22,649,400
United Kingdom	13,074,800	15,501,500
Australia	2,229,800	5,578,600
Singapore, for transhipment to North China and Russia	3,973,700	3,237,600
Russia	106,500	2,005,300
Canada and America	193,400	403,800
Other countries	2,256,700	1,142,300
Total...	40,639,200	50,518,500

Tea Trade of Asia.

(From Consul-General George E. Anderson, Hongkong).

While the production of tea in the districts from which Hongkong draws its supplies seems to have been greater in 1911 than in 1910. The total exports of tea by way of Hongkong during 1911 were only about 74 per cent. of those in the year previous. The statistics of the Hongkong General Chamber of Commerce show the exports to have been as follows in chests:—

	1910.	1911.
To Continental Europe ...	16,950	4,385
To Great Britain	37,948	48,387
To the United States and Canada...	35,985	12,682
Total ...	90,883	65,454

The increased shipments to Europe were in line with the augmented demand in that part of the world. The decrease in the volume of the shipments to the United States and Canada was due partly to American restrictions against artificial colouring, but particularly affected Canada, for the value of shipments to the United States rose considerably. However, the decreasing nature of the movement to the United States is indicated by the fact that figures covering the exports of tea from Foochow show that shipments to Europe from that port increased from 11,143,811 pounds in 1910 to 14,329,339 pounds in 1911, while shipments to the United States and Canada declined from 4,589,033 pounds to 3,260,018 pounds, total shipments to all parts of the world from Foochow amounting to 20,688,915 pounds in 1911, compared with 19,159,580 pounds in the year 1910.

The decrease in shipments by way of Hongkong in view of the increased shipments from producing centres is significant. The larger shipments to Europe go direct from the ports concerned, though the increase has not been great enough to materially modify shipping arrangements. The value of tea shipped from Hongkong to the United States including Hawaii, during the past year was $123,423, as compared with $117,589 in 1910. —*Spice Mill.*

In the United States.

The tea trade is greatly interested in the ruling of Secretary of the Treasury MacVeagh, in which he declined to permit two importing firms, Smith, Baker & Co. of Japan, and Mitsui & Co., to enter a large quantity of rejected Formosa teas under an agreement that the teas would be mixed with a product of higher quality and this be made to come to the standard. The Treasury Department's official statement on the subject is as follows:—

"The Department has decided not to grant the request of various importers of Formosa teas, that they be permitted to blend certain teas that have been rejected with other teas of higher grades for the purpose of raising the rejected ones up to a sufficiently good quality to pass the required examination.

"The Department is convinced from the informal report of the Chairman of the Tea Board and the other members of the Board who assisted him, and also from independent inquiries, that there is no ground for any criticism of the action of the tea examiners in their original rejections, most of which were sustained by the Board of General Appraisers on appeal." —*Spice Mill.*

RUBBER.

Systems of Tapping.

The India-Rubber Journal writes:—"We are naturally pleased to notice the adoption of a system of tapping advocated in these column since 1907. We have, in and out of season, advised the quarter-section system of tapping and a period of at least four years for renewal of bark. Mr. Frederick Anderson, at a recent meeting of the Gula-Kalumpong Company, stated that "the average yield per tree is 1·76 lb.; our system is to tap one-quarter of the trees each year, which allows four years for the renewal of the bark." Our Manager reports that "in many cases the first renewal of bark is quite fit for tapping in three years, but his opinion is that the second and subsequent renewals may not be so quick, and that at least four years should be allowed. He has some doubt, as to whether even four years will be sufficient as the trees get older, and says that it may then be found necessary to give them a longer rest at intervals, say, for a full year at a time, if returns are to be kept up. He also adds that bark renewal varies a good deal in different estates. Under these circumstaces, it may be as well to look with some doubt upon abnormally high returns anticipated from old trees. From our oldest trees we got an average of about 5 lbs. per tree last year on renewed bark, but in the estimated production for this year are only counting upon getting about 3 lbs. per tree from this limited area, as we are tapping the upper bark to allow more time for renewal on the lower tapping area. In this small portion of the estate, which is now about ten to twelve years old, the trees were planted about 240 to the acre. Bark renewal is slower in closely-planted areas than it will probably prove to be in the great bulk of our estate, which is planted about 130 trees to the acre. In our report we have not attempted to give any estimate of the return per acre, as we are tapping incomplete areas, and calculations based on the yield per acre are, therefore, apt to be misleading." In a recent publication, Wright's 4th edition, the author states that "though much depends upon the rate of growth, I am, in general, inclined to the view that it would be wiser to lengthen rather than shorten the four-year interval which I have up to the present advocated." These views are gradually being approved by leaders of the plantation industry.

Rubber Industry in Java.

A fair number of the Java rubber estates have now reached the productive stage, but the majority of these only began to tap on an extended scale towards the end of 1911, and no information on the subject of production, cost, &c., has yet been published.

Some statistics of this nature have been obtained privately, but these refer mainly to a few young estates situated in one part of the island. That Java estates can produce rubber of a superior quality is unquestioned, and so far as can be judged from the figures at present available the outlook is by no means discouraging, returns from the more advanced plantations showing a steadily increasing production per tree, and low cost. A few estates complain of labour difficulties, but as the industry developes and the cultivation of rubber becomes more familiar to the natives, these troubles will, no doubt, gradually disappear. Tapping is readily learnt by the coolies, and managers generally express themselves as satisfied with the daily task performed.

Exports of rubber from Java during 1911 amounted to 982,600 lbs., as compared with 156,700 lbs. during the preceding year, but some considerable part of this represents wild rubber from outlying islands.

Coagulation and Curing of Para Rubber.

Mr. R. Derry, the Curator of the Botanic Gardens, Singapore, has patented an invention for effecting improvements in the curing of Pará rubber. It is an anti-metal process and the apparatus has been designed to accommodate the process of coagulating latex as it is brought from trees, without the addition of chemicals. In this first respect the process, we are told, differs from all others that obtain, *viz* :—the machinery or apparatus has been modified so as to coagulate latex direct and not latex treated or manipulated to suit the machine. . . . It is suggested by the inventor :—

(1) That additional drying houses could be supplied with smoke from the smoke-chamber furnaces and that the smoke be applied by piping perforated underneath which should be received in a filter trough before dispersing, care being taken that the fuel is dry. By this system of applying smoke uniform results can be obtained. The drying house would only require slight ventilation during smoking and additional ventilation at other times. A few days' smoking would suffice.

(2). That the process under review could be carried out in existing or central factories, and is also adopted for decentralised factories with hand or motor power, or portable buildings.

It is claimed :—

(1). That the weight of the resulting rubber of a given volume of latex is increased by this process as there is no loss of caoutchouc which occurs when latex is treated in volume.

(2). That it is a perfect system of coagulation, and by the thin accumulation of films of latex and separation of water in the process, coalescing is avoided, and the minutest component particles down to the molecule are exposed to the action of smoke and smoker-curing, thus precluding the possibility of subsequent oxidisation.

(3). That the inherent characteristic of Hevea latex to foul when in contact with another body (a spout, a funnel, or when flowing or dripping) has been overcome in the method adopted in supplying the belt by dipping outside the smoke area.

(4). That the process disposes of the whole difficulty of fungoid attacks whether in the latex ; in drying ; store ; or transit.

(5). The keeping quality is assured. A fair-sized sample one year old was reported by a large manufacturer, "to be equal to fine hard Pará for all practical purposes," and the specimens of smoked spindles, prepared by myself and analysed at the recent Rubber Exhibition in London and reported comparable to fine hard Pará, were three years old.

(6). In the arrangement of combustion, draft, filtration, and ventilation, wood napthaline and other impurities in the smoke injurious to latex are disposed of ; the excessive water and the resulting water vapour in wood fuel is exhausted, and a concentrated smoke containing the necessary elements in a compound form is produced.

(7). That the variation in latex, already referred to, is largely overcome by the method of supplying latex on a travelling belt from outside the smoke chamber, where the amount of latex taken up by the belt can be regulated by the adjustable feed pans so as to ensure consistent separation of water and the action of smoke. The variable consistency of latex is disposed of and the resulting rubber is of a standard form.

(8). Finally a standard rubber, which will keep for years and prove superior in the vulcanising process, the real test, to any other Plantation Rubber.—*Ceylon Observer.*

THE NILGIRI EXPERIMENT PLOT.

Coffee Hybridisation.

The following Correspondence which has taken place between a Special Committee of the Nilgiri Planters' Association and the Scientific Officer is published as being of interest to all coffee planters who are interested in the subject of Coffee Hybrids.

Extract from a letter dated 2nd May from Messrs. C. Gray and P. Beaver to the Scientific Officer.

" At a meeting of the N.P.A. held in Ooty on April 16th the matter of the hybridization plot came up for discussion, when the following minute was passed :—

> 'After further discussion it was proposed by Mr. Oakes, seconded by Mr. Nicolls, and carried : " That Messrs. Grey and Beaver be empowered to write to Mr. Anstead and to protect the interests of this Association by taking any steps necessary with reference to the experimental plot."

" We have, therefere, the honour to address you on the subject and trust you will be able to favour us with some information on certain points.

" We are aware that you are personally much interested in the raising of these hybrids, and trust that its being taken up by our Association will be gratifying to you. We understand that the plot has not been quite started yet, in fact that the ground is only lately cleared. May we, therefore, help you and Mr. Butcher by making a few suggestions which we, of course, must leave to you to carry out or not as you deem advisable.

" To simplify matters we are putting the points on which we wish you to oblige us with information in the form of questions.

1. " Is it intended to start the block with some hybrids from Coorg or Mysore ?

2. " Is the complete parentage of these hybrids known, *i.e.* have they been raised from plants chosen for some good or particular character ? We conclude the hybrids are *arabica* and *liberica.*

3. " Are these hybrids of the 3rd generation, if so, has there been careful choosing and elimination in former generations with the object of getting plants with *fixed* characters ?

4. " Is not the principal—though not necessarily the sole—aim of this experiment the obtaining of hybrids which will be able to resist entirely, or in part, the attacks of green bug ?

5. " Would it not be better, if the aim is a bug resisting hybrid, to leave the Mysore or Coorg hybrids out of the Nilgiri Block, there being no green bug in Mysore or Coorg—allowing this part of the experiment to be carried out by the planters now interested with advice from the Sc. O. when it is required ?

6. " Do you think it is possible that if a bug resisting hybrid were successfully raised it might also be strong enough to resist other pests and diseases, thus making the ultimate result of the experiment more important and valuable ?

7. " Do you think that hybridizing—such as is required for this experiment—can be safely carried out on a coffee estate even with the care of placing muslin over the whole plant, it being borne in mind that every precaution must be taken against outside or accidental fertilization ?

8. " Will not this experiment before being completely and satisfactorily ended occupy very many years ? This being so would it not be advisable to start from *selected* seedlings, thus giving the full value to the experiment ?

9. " A 'bug proof' plant having been found (we believe there is one on the Mannar Estate and Kolakamby) could not the seedlings from this be raised on the trial plot—when six inches or more in height, bug could be introduced in the nursery—those resisting or more resisting could be chosen as future parents, lifted, taken to Ooty and placed in tubs under the care of Mr. Butcher. In Ooty it would be impossible to have any accident except through carelessness which could be easily provided against. *Liberica* seedlings could be raised and grown in one of the glass houses.

10. " Will a L x A hybrid grow on high elevation estates, and what would you put as the limit ?

11. " Would 'robusta' make a better parent with 'arabica' for high and low elevations ?

12. " Would you also advise the growing of *selected* arabica—the object being a 'bug proof' plant—the high *bearing* qualities being again *selected* from the seedlings ?

13. " Will the plants in the trial block be treated exactly as estate plants, *i.e.*, 18 inch pits and no manure to start with, and say 9 ft. x 9 ft. apart—otherwise may not a large pit and heavy manuring give misleading results ?

14. " Are the proposed crosses
arabica x liberica (1) liberica
„ x robusta (2) robusta (3)
which will give six crosses ?"

———o———

Extract from a letter dated 7th May from the Scientific Officer to Messrs. C. Grey and P. Beaver.

" I beg to acknowledge the receipt of your letter dated 2nd May calling my attention to a Resolution passed at a meeting of the N. P. A. held on 16th April appointing you a Special Committee to take charge of the Hybridisation work. Allow me to say at once that I most heartily welcome your co-operation in this work, and I shall be very glad indeed if you will be good enough to superintend the original planting up of the plot in October. Without the aid of an Assistant in the Nilgiris it is difficult for me to give the necessary supervision to the actual planting and cultural work to be done, and I shall be very much obliged if you can arrange to supervise this.

" I will first of all deal with the questions set out in your letter and then give you a sketch of my proposed working plan.

1. " It is proposed to start with :—

(*a*) A number of pure types, *i.e.* pure as far as variety is concerned. I have sent seed to Mr. Butcher of the following varieties for this purpose and plants should be ready in October :—Mocha from Coorg : Jamaica Blue Mountain from trees grown from imported seed in Coorg ; Marigogipe ; Arabian ; Liberian ; Robusta.

(*b*) Existing hybrids, *viz.* 2nd generation from Chundrapore ; 3rd generation from Chundrapore ; Liberian and Arabian hybrids from Saklaspur and Benhope offered by Mr. Rhodes-James.

2. "As far as the Chundrapore hybrids are concerned the seed is self-fertilised from two picked trees, chosen for good characters by Mr. Hamilton and myself some years ago, and it is the hybrid we are concentrating our attention upon in Mysore. It is Liberian and Arabian. Of the parentage of Mr. James' hybrids I know practically nothing, but I personally selected a tree with him from which seed was to be saved after ensuring self fertilisation by netting.

3. "The answer is in the affirmative as far as Chundrapore hybrids are concerned.

4, "The object I have in view is to obtain a hybrid which will—

(*a*) give a big yield,
(*b*) give a high quality of bean,
(*c*) be vigorous as regards growth,
(*d*) be resistant to green bug and other diseases.

5. "The Mysore hybrids are very markedly resistant to leaf disease and there is also evidence to show that they are resistant to root disease. Consequently it is possible, and indeed probable, that they may also be resistant to green bug. If they are so resistant we have saved some years of work, if they are not they can be and will be eliminated. Therefore, I think it is worth while trying them.

6. "The answer is in the affirmative and is as stated above under 5 an argument in favour to trying the existing hybrid known to be resistant to leaf diseases.

7. "Netting is a quite sufficient precaution against outside pollen. The coffee pollen is carried by insects.

8. "No doubt the result aimed at will take many years to obtain. The seedlings put out will certainly be selected in the nurseries. We only require a few of each kind, so the selection can be a drastic one.

9. "This is a suggested line of work with selection methods. Selection is a very tedious method always and requires a lot of attention and a lot of room. Thousands of seedlings would have to be grown to ensure getting even one that was bug proof by selection. Consequently I expect to arrive at the result more quickly by hybridisation methods.

"I discovered the so-called "bug proof" tree on my first visit to Mannar and suggested a method of selection to the Manager. I believe he began work on these lines but I am not sure how far he proceeded. I feel that this is a work better done on an estate where it can have the manager's constant supervision than on a small experiment plot which will, I fear, always suffer from want of supervision. Therefore I suggest that we request the Manager of Mannar to undertake the work on the lines you suggest.

10. "This must be determined by experiment.

11. "Robusta being a low land coffee probably its hybrids would be low land coffees. The hybrid I hope to make and expect a good deal of is Arabian and Marigogipe.

12. "Selection methods are dealt with in No. 9 above.

13. "We are aiming at making a hybrid first, and so will manure, etc., to produce quick and vigorous growth. This treatment cannot give misleading results, since manurial treatment is not an inherited character. Estate methods will be adopted as far as possible but cannot be entirely adopted since the purpose and treatment of the trees is entirely

different. For instance it is possible that for fertilisation purposes it might be an advantage to confine a tree to only a few primaries, or to rub off all the blossom except a few bunches, and so on. Special treatment of this sort implies special cultural treatment also. The planting distance should, I think, be 12 feet x 12 feet, because the hybrids grow big and also we shall need plenty of room for netting and for getting round the trees easily and rapidly when fertilising. This is a *special* plot for *special* purposes and I think must necessarily be rather more like a garden than an estate.

14. " The proposed crosses are, for the present :—

1. Arabian x Liberica.
2. Arabian x Robusta.
3. Arabian x Marigogipe.

" I think Liberica x robusta would be quite useless, both are poor types of bad quality coffee. Other possible crosses for future work are :—

(A x L) x Marigogipe.
(A x L) x Congensis.

" There are infinite possibilities but we must confine ourselves to a few and not " bite off a bigger bit than we can chew."

" The following is the working plan I suggested to Mr. Butcher last February and I should like to adhere to it as closely as possible unless you can show me any grave objections. As I have said above this plot is for a special purpose and I do not think that it is either possible or necessary to adhere strictly to estate practices. It does not follow as a matter of course that the seed from a tree which has been highly manured and " nursed up " will produce plants which are weaklings and also need coddling—in fact the reverse is nearer the truth.

" My working plan is—to establish plots of pure varieties, each plot to contain 12 trees planted 12 x 12 so that we can easily get at them to net and work. Between each plot a double row is to be left, *viz.*, 24 feet. Each plot will be plainly labelled and lettered A, B, C, etc., on a plan, each individual tree having a number, so that A_1, B_2, and so on must refer to a particular tree whose exact position is known.

" The hybrids, both those put in now and those made and planted out in future years, will be grown in similar plots similarly numbered and lettered. Thus, for example, E 10 would refer to a hybrid whose parentage and everything about it was known and on record.

" Between the rows I suggest that a six foot wide strip of *Tephrosia purpurea*, or some equally suitable leguminous green dressing plant,.should be grown, and that the six foot square in which each coffee plant stands should be kept clean.

" I understand from Mr. Butcher that the plot has been cleared and prepared for planting and that the best time to plant is in October. I also believe that his nurseries are in good order.

" The first thing to do is to get our pure types established in plots and I think that you would be " protecting the interests of your Association" and you would most certainly be giving Mr. Butcher and myself invaluable aid if you would arrange to superintend this original planting and see that it was done properly.

" I trust that I have given you the information you required, Gentlemen. I shall be happy to discuss any of the points raised further and to have the benefit of your advice and suggestions."

(To be continued.)

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A Still for Camphor.

(*Continued.*)

[In the *Planters' Chronicle*, Vol. VII, No. 15, p. 237 a correspondent asked for drawings of a camphor still. Mr. L. Lewton-Brain, the Director of Agriculture in the Federated Malay States, in reply to a letter the Scientific Officer wrote to him on the subject, has most kindly sent a Bulletin recently published by his Department which contains an account of recent experiments in Malay with the distillation of Camphor, together with a description of a still designed for the purpose and drawings. Unfortunately it is not possible to reproduce these drawings in the *Chronicle*, but a reprint of a lengthy extract from the Bulletin describing the still and the results obtained with it is continued in this number, and, Mr. Anstead will be happy to forward tracings of the drawings to any planter who wishes to obtain them.]

Further Experiments during 1911-1912 with a New Condenser.

The first systematic distillations on a large scale were commenced during September, 1911, and have been carried on for about five months.

As a tube condenser was found to be readily blocked by the solid camphor which condensed in the tubes, it was decided to construct a wooden still of the Japanese type previously described.

New Wooden Condenser.—(*Vide* Fig. Ic and Fig. 4). The new condenser was constructed of teak and had the following dimensions:—

Large box	Length	4' 0"
	Breadth	2' 6"
	Depth	1' 1"
Small inverted box	Length	3' 4"
	Breadth	1' 10"
	Depth	1' 6"
Extension of sides over bottom ...	...	4"
Depth of water in large box ...	...	6"

The cooling water was allowed to flow over each side of the small box instead of having a single overflow pipe, as, by adopting this plan, the sides of the condensing box did not become so heated as with an overflow pipe only.

This condenser was attached to the still as shewn in Fig. I.

Yields.—The following results were obtained in various distillations with the above condenser.

No. of distillation.	Original weight of prunings.		Weight of prunings after drying.		Total yield Camphor oil.		Yield per cent. on original material.
	lbs.	kilos.	lbs.	kilos.	lbs.	Grms.	
1— 4	220	100	147·5	67·0	1 2	540	0·50
5— 9	300	136·4	200	90·9	0·4	175	0·13
10—15	336	152·7	225	102·3	0·6	260	0 17
16—17	90	40 9	60	27·2	0·4	170	0·41
18—21	260	118·2	174	79·1	0·6	260	0·22

The above results represent twenty-one separate distillations, one being carried out per day, and the condenser opened in each case after several days, *e.g.*, on the 4th, 9th, 15th, 17th and 21st day.

A number of these distillations were controlled by laboratory distillations carried out with a copper still and glass condenser as previously described, and it was found that the very small and very variable yields given above, *viz.*, from 0·13 to 0·5 per cent. of camphor and oil from fresh green prunings was due entirely to the inefficiency of the wooden condenser.

This was also confirmed by observing that the cooling water in the large condenser frequently became very hot, rising at times to a temperature of 60° C inside the condenser, and that at the same time a thin film of oil which consisted of camphor and camphor oil remained continually on the surface of the water and was thus lost in the overflow water, which always possessed a strong camphoraceous odour.

It was also found that the camphor and oil condensed almost entirely in the last two compartments of the box and a very fine cloud composed of fine particles of camphor was also often observed issuing from the exit pipe of the condenser, and lastly the joints of the box were found to leak badly, owing to the uneven swelling of the wood caused by the hot steam and vapours.

In order to remedy these defects a second slightly smaller wooden box divided into compartments in a similar way, was inverted over the first, so that any vapour issuing from the exit pipe of the first condenser could condence in this second box.

This, however, was found quite inefficient, the losses being equally great as soon as the condensing water became at all hot.

It is, I think, very probable that the boiler was too large in comparison with the still, so that an excess of steam was generated, which it was difficult to control in a boiler of the type used.

DISTILLATION WITH A NEW GALVANISED IRON CONDENSER FIG. Ic and FIG. 4.)

It was finally decided to abandon the wooden condenser and to substitute a metal one and in order not to discolour the camphor and oil a galvanised iron box was constructed to my design.

This condenser was slightly longer and broader than the wooden condenser, but not so deep, and was inverted in the original large wooden box previously described, allowing only about one inch clearance all round.

V-shaped grooves were cut along both of the longer sides in each compartment at the bottom (inverted top) to allow the water in the outer box to circulate through (*Vide* Fig. Ic and Fig. 4.)

The dimensions of this metal condenser were as follows:—

Length	3' 10"
Breadth	2' 4"
Depth	1' 7"
Extention of sides over bottom	4"
Length of exit pipe	6½"
Diameter of exit pipe	2"

A handle was attached to each end of the condenser so that it could be easily raised, after distillation was completed, to remove the camphor.

It was soon found that this condenser gave excellent and constant results, and the yields from prunings, similar to those used in the distillations with the wooden condenser, were considerably increased.

It was also found that practically all the camphor and oil condensed in the first compartment, only a little collecting in the second compartment and none in the remaining compartments.

The camphor was also of a beautiful white colour and was obtained in compact cakes floating on the water or in "flowers" form the sides and inverted bottom of the condencing box; the camphor oil was also of a pale yellow colour. No trace of corrosion of the condenser appears to have occurred during three months' use and no leakage could occur at any joint as these were all soldered. The overflow water was also quite cool owing to the good conducing properties of the metal condenser.

The problem of the condenser, which was one of the chief difficulties in connection with the distillation process, is thus solved.

YIELDS.

The following are results obtained withe metal condenser:—

No. of distillation.	Original weight of prunings.		Weight of dried prunings.		Total yield of camphor & oils.		Yield per cent. on original material.
	lbs.	kilos.	lbs.	kilos.	lbs.	grms.	
22—25	240	109·1	160	72·7	1·8	810	0·74
26—30	280	127·2	184	83 6	2·3	1030	0·80
31—32	80	36·4	55	25	0·5	230	0·63
33—34	80	36·4	56	25·4	0·5	220	0·60
35—36	80	36·4	511	23·2	0·6	285	0 78
37—40	301	136·8	243	110·4	1·9	873	0·60
41—44	311	141·4	279½	127·0	2·0	932	0 65
45—46	174	779·1	128	58·2	1·1	535	0 70
47—48	157	71·4	121	55·0	1·0	464	0·65
49—51	126	57·3	...	...	0·8	359	0·60
52—55	208	94·5	...	...	1·6	730	0 77
56—57	155	70·4	...	...	0·9	420	0·60
58—61	268	121·8	...	...	1·6	745	0 60
62—65	251	114·1	...	...	1·5	683	0·60
66—69	259½	118	...	...	1·7	774	0 65
70—73	280½	127·3	...	...	1·9	890	0·70
74—77	301	136·6	...	...	2·05	930	0·69
78—79	189	86	...	...	1·0	452	0·53
80	45·5	20·6	20·5	9·3	0·26	120	0·58
81	45·5	20·6	18·7	8·5	0·20	92	0·44
82	91	41·3	37·5	17 0	0·67	307	0·74
83—86	346	157·2	...	...	2·11	960	0·61
87—90	388	176·3	...	...	2·95	1340	0·73
91—96	681	309·5	...	...	4·02	1826	0·60

These distillations were all carried on for three hours although in a number of cases this period was extended in order to ascertain whether any further yield was obtained. In no case was any further yield obtained after a distillation period of three hours.

Distillations 1—36 were carried out with prunings from two year old trees grown at Batu Tiga; the prunings had become quite air dry, as the distillations were carried out, in these cases, two weeks or more after the prunings were cut. Distillations 37—48 were carried out with prunings from other trees from the same plot, but had only become slightly dry during transport by rail to Kuala Lumpur. Distillations 49—79 were carried out in every case with fresh prunings from four year old plants grown in the Experimental Plantations at Kuala Lumpur. All of the plants were raised from seed obtained from Japan. Distillations 80—86 were carried out with prunings from four year old trees sent by Mr. Alma Baker of Batu Gajah. They had become fermented by being packed in bags, as they were lying for several days at the railway station.

Distillations 83—96 were carried out on prunings from 4 year old trees grown at Kuala Lumpur; these prunings were exposed to heavy rains and tropical sunshine for nearly a fortnight, being left in bundles in the open.

It will be observed from the results that the drying does not diminish the yield calculated on fresh material.

Separate distillations of leaves and twigs from two year old trees were also made to ascertain the yield from each, with the following results:—

No of trees.	Weight of leaves	Weight of branches.	Camphor & oil in leaves. Per cent.	Camphor & oil in stems. Per cent.
32	102	199	1·4	0·20
35	121	190	1·5	0·20
17	58	99	1·6	0·10
16	52	122	1·6	0·25

The following results were obtained from leaves and stems from four year old tsees:—

No. of trees.	Weight of leaves. lbs.	kilos.	Weight of stems. lbs	kilos.	Camphor & oil in leaves per cent.	Camphor & oil in stems per cent.
12	89	40·4	170½	77·4	1·5	0·20
12	93½	42·4	187	84·9	1·7	0·20
12	106½	48·3	194½	88·3	1·5	0·22
6	68½	31·1	120½	54·7	1·3	0·13

In all of the above distillations the distillate consisted principally of camphor with only a small production of camphor oil.

PURIFICATION OF CAMPHOR.

The camphor obtained in the galvanized iron condenser was almost white in colour, but contained oil and water as impurities. The greater portion of the oil was removed by treatment in a small press.

The crude camphor was subsequently sublimed by heating with a mixture of charcoal or lime, and collected in the form of "flowers" from a glass bell-jar. Translucent cakes could be obtained by melting the "flowers." The camphor thus obtained possessed all the characteristics of natural Japanese camphor, thus:—Melting point 175° C. Melting point of Oxime 118° C. Peculiar rotatory motion on water.

(*To be continued.*)

DISTRICT PLANTERS' ASSOCIATIONS.

Nilgiri Planters' Association.

At the Annual General Meeting of the Nilgiri Planters' Association held at the Armoury, on Thursday, the 30th May, 1912, *the following members were present* :—

PRESENT.—Messrs. E. F. Barber, (in the chair), J. S. Nicolls, (Honorary Secretary), L. L. Porter, C. Gray, A. S. Dandison, R. Bake, E. S. Clarke, C. H. Brock, S. Bayly, W. Rhodes James, A. R. Pigott, C. Rowson, E. Hardy, A. K. W. Downing, L. G. Rogers, J. B. Vernede, F. J. Stanes, G. A. Aird. Present by proxy—Messrs. A. G. Nicholson, H. L. and H. S. Andrews, and F. M. Cockburn. *Visitor.*—Mr. E. H. Jones, D. S. P.

No. 14.—*The Proceedings of the last meeting were read and confirmed.*

No. 15.—*The Honorary Secretary read* the annual report and presented accounts :—

" Mr. Chairman and Gentlemen.—In submitting the annual report and ' accounts for the year ending December 31st 1911, I would state that I ' took over the Honorary Secretaryship from Mr. Porter on 1st January, ' 1912. So I hope you will forgive me in not giving you as detailed or as ' interesting a report on the business done in the past year as Mr. Porter ' would have done. I think he ought to have moved this task off my ' shoulders. Under the circumstances I hope you will accept a brief ' summary."

" One matter I would like to mention concerning the S. I. Railway ' freight. This is a matter Mr. Porter has taken a keen interest in, and is ' still taking, for which I am certain you are all thankful to him. I hope he ' will be able to report further progress at this meeting."

" During the year there were two general meetings held, one on 23rd ' March at which 19 members were present, one on 4th December at which ' 8 members were present. and the last annual meeting on 29th May at ' which ten members were present, the Scientific Officer being present at the ' meeting held on 23rd March 1911, when he gave an interesting report on ' his tour in the Nilgiris."

" The accounts are on the table and they have been duly audited. I ' remark on them briefly as follows :—

" The balance brought forward at credit of cash and Bank account from ' 1910 was Rs.699-13-8. Amount recovered on account of Annual Subscrip' tion during 1911 Rs.800 as against Rs.931-1-0 in previous year. Amount ' recovered on Scientific Officer's account Rs.1,295 as against Rs.1,755 in ' previous year. Amount paid on account of Planters' Benevolent Fund ' Rs.50 as against Rs.55 in previous year. I would ask all members to ' subscribe something towards this fund. It has an excellent object in view. ' It is an insurance policy, and one on which I am certain we, all of us, hope ' we may never have to draw, but there may be even amongst us one who ' one day from no fault of his own will welcome help from the funds and his ' prayers will then be said for those from whose subscriptions this fund has ' been built up. Amount paid on account of Laboratory Fund amounted to ' Rs.35 as against Rs.255 in the previous year. I think there is something ' wrong with the way members have been charged in this account. I think 'their original subscription was really meant as a donation and not as a 'yearly subscription and ought not to have been treated as such.

	Rs.	a.	p.
'Office and Bangalore Delegates' Expenses amounted to ...	465	6	1
'Paid on account 1911 subscription to the U. P. A. S. I. being ¼ of our subscription, balance has since been paid	530	9	6
'Subscription to Sc. O. Fund for 1911	1,250	0	0
' Do Planters' Benevolent Fund	65	0	0
' Do Laboratory Fund...	265	0	0
'Cost of Mr. Hodgson's photo...	70	0	0
'Balance at credit of cash and bank acounts on 31st December	296	13	1

'At end of year the following amounts were due by members:—

'Annual Subscription Rs.430, Sc. O. Fund Rs.480, L. Fund ... Rs.50

'Since which date I have recovered,

'Annual Subscription Rs.210 Sc. O. Fund Rs.229. L. Fund ... Rs.25

'Leaving a balance of Rs.220 Sc. O. Fund Rs.260, L. Fund ... Rs.25 'still out-standing of which Rs.200 is due on 1910 account and Rs.305 on '1911 account.

'Of this amount Rs.260 is due by one member and from what I see 'there is little chance of recovering same.

'One member denies ever having joined the Association, and refuses to 'pay the amount due on our books. From the correspondence I have been 'able to find on the matter, I think his statement is incorrect.

'Another estate which is on a list of subscribing estates as received 'from the late Honorary Secretary, but I suppose has since changed hands, 'refuses to subscribe to the Association. The Manager's letter is amusing 'and I am certain you will all congratulate him and his Company on the happy position he is in as regards his labour.

'We have lost one member by death, one retired during the year repre- 'senting 73 acres, and one member joined the Association representing 500 'acres. Mr. Sheldrick's name was removed from our list as he had left the 'District. He must have been one of the oldest members of our Associa- 'tion. The total number of members on 31st December 1911 was 68, 'representing 16,970 acres, on which acreage we paid our subscription to the 'U. P. A. S. I.

'Thanking you all for the support you have given me during my short 'term of office, I now place the resignation of the Committee and myself 'in your hands.'

The report was adopted and accounts passed with a vote of thanks to Mr. J. S. Nicolls.

No. 16. *U. P. A. S. I. Subscription.*—Referring to para. No. 3 of the General Meeting held on 16th of April. This was confirmed.

No. 17.—N. P. A. referring to para. No. 4 of the General Meeting held on 16th April, the following resolution was proposed by Mr. W. Rhodes James and seconded by Mr. A. S. Dandison.—"That a cess of 2½ as. per acre shall be levied on the whole of the planted area of an estate. Any individual not a proprietor may be elected as a personal member of the

Association by ballot at a General Meeting after submitting his name to the Committee on a subscription of Rs.12 per annum."—Carried unanimously.

No. 18. *Rules of the Association.*—Accepted as drawn up by Messrs Brock, Bayly and Downing with the following alterations:—

Rule No. 4.—After 'until such subscription be paid,' add 'on a member 'withdrawing from the Association all his subscriptions shall be paid prior 'to such withdrawl.'

Rule No. 7.—For 'in the same office,' read, 'to the same office.'

Rule No. 9.—Instead of rule as originally drafted, read: The Committee 'shall consist of the Chairman, Vice-Chairman and the Honorary Secretary 'Ex-Officio, and six other members who shall be appointed yearly by show of 'hands or by ballot at the Annual General Meeting. In the event of any 'vacancies occurring the Committee shall have the power to fill such 'vacancies."

Rule No. 10.—Instead of 'illness or resignation of the Honorary Secretary,' read 'Illness of the Honorary Secretary,' and add at the foot of rule—'In the event of resignation of the Honorary Secretary his duties 'shall be undertaken by the Chairman or the Vice-Chairman as above until 'a new Honorary Secretary is elected by the Committee.'

Rule No. 12.—Instead of 'in the month of May' read, 'in the month of January.'

Rule No. 14.—For 'by any eight members,' read 'by any five members.' Instead of 'no other subjects except those so signified can be discussed,' read 'no resolution except those so signified shall be passed.'

Rule No. 20—Omit the words 'shall be entitled to one vote for his personal subscription and in addition.'

Rule No. 21.—For 'subject to rule 3,' read 'subject to rule 4.' Instead of 'and must be properly stamped,' read 'and duly witnessed and stamped.' Instead of 'A majority of two-thirds etc.' read 'A majority of three-fourths.'

Rule No. 26.—Read as follows 'Copies of the proceedings of all 'General Meetings shall be printed and forwarded to all members and 'Honorary members of the Association, *The Planters' Chronicle*, and to 'such newspapers, Associations, Institutions, and individuals as may be 'selected by the Committee."

A vote of thanks was passed to Messrs. Bayly, Brock and Downing for the work done by them in framing these rules.

No. 19.—*Labour Circular.*—The Honorary Secretary informed the meeting that he had received the 5,000 copies he was authorized to order in the meeting held on 4th December, 1911. All members had been informed and asked to send in their requirements. So far only 988 copies had been taken by ten members.—Noted.

No. 20. *Experimental plot.*—Mr. Gray briefly informed the meeting of what had been done. Proposed that all the correspondence on the matter be published in the *Planters' Chronicle* and a vote of thanks given to Messrs. Gray and Beaver for all the work they have done. Resolved: "That the Honorary Secretary be asked to write to the Collector for the necessary space at the Ootacamund gardens."—Carried.

No. 21. *Railway Freight*—Correspondence recorded. Noted that the Railway are preparing a report which will be communicated to the

Association as soon as finished. Passed a vote of thanks to Mr. Porter for the trouble he has taken.

No. 22. *Subscriptions.*—The Honorary Secretary was requested to write to the defaulting member forwarding him copies of his letters.

No. 23. *U. P. A.. S. I. Exhibition.*—Members were asked to send in exhibits.

No. 24. *Attesting Officers.*—Messrs. G. W. Church and O. W. Marden have been elected attesting officers under Act I of 1903.

No. 25. *Act I of 1903.*—The Collector's report on the working of the Act for the past year was recorded. Proposed by Mr. Rhodes James and seconded by Mr. L. Rodgers: "That the Collector be approached with a view to giving a definite ruling on Notification No. 7 of 23rd December, 1904 with special reference to judgment in Calendar Case No. 918 of 1912 from the 2nd Class Magistrate's Court, Coonoor.

No. 26. *New Member.*—Mr. Von Dulong was elected.

No. 27. *Election of Office Bearers for 1912.*—Committee—Messrs. G. A. Aird, J. H. Pascoe, E. Hardy, W. Rhodes James, L. L. Porter, C. W. Deane, A. S. Dandison and J. H. Wapshare. Hon. Secretary, Mr. J. S. Nicolls.

No. 28. *Non-service of Warrants*—The Hon. Secretary be asked to write to the Collector *re* the D. I. G.'s report.

No. 29. *Election of Deligates to the U. P. A. S. I.*—Messrs. C. H. Brock and J. S. Nicolls were elected as representatives.

Votes of thanks to the chair and O. C. Nilgiri Volunteer for the use of the room terminated the proceedings.

(Signed) E. F. BARBER,
Chairman.

(„) J. S. NICOLLS,
Hony. Secretary.

NOTE.—The next meeting will be held on or about the 18th July.

Papers on Table.—The Memoirs of the Department of Agriculture, April, 1912. The Agricultural Journal of India April, 1912.

COFFEE CROP PROSPECTS IN SAO PAULO.

H. M. Consul at Sao Paulo, Mr. D. R. O. Sullivan-Beare, reports :—

Predictions have appeared lately in the foreign press to the effect that the Sao Paulo coffee crop for 1912-13 will be exceptionally large, and that, consequently, the market value of the commodity is bound to decline heavily. In this case the wish is assuredly father to the thought. There exist at the present time no data upon which to base a reliable calculation as to the size of the coming coffee crop in this State. One important fact, however, must be borne in mind in this connection, namely, that during the month of August last year the coffee districts throughout the State were subjected to the very unusual experience of a spell of sharp frost. It is the opinion of experienced planters at Sao Paulo that the result of such visitation is to diminish, in marked degree, the productive power of the coffee shrubs not only during the season immediately following upon the frost, but during the next following season also. The general opinion held in Sao Paulo is that the coming crop will not greatly exceed 9,000,000 bags.

THE NILGIRI EXPERIMENT PLOT.

Coffee Hybridisation.

(Concluded).

Extract from a letter dated 12th May from Messrs. C. Gray and P. Beaver to the Scientific Officer.

" We are obliged for the full information contained in your letter of the 7th instant:—

" Most certainly we shall have great pleasure in superintending the planting up of the block in October next, or at any other time that may be decided on. We think if the plants are ready that a better time would be in the S. W. monsoon, so that they may be partly established by the time the N. E. arrives—this will allow the plants a better chance of pulling through the dry weather in the early months of 1913. Of course if water is available and it is proposed to water these, the time of planting is immaterial. Any other help we can give is at your disposal.

" We are afraid you have misunderstood a few of our notes. For convenience we shall keep to the numbers of the original questions, making reference easy.

" 7. We did not suggest danger from wind borne pollen, as we are aware that Coffee blossom is entirely fertilized by insects.

" Is it *quite* settled that coffee is *self* fertilizing? The appearance of the flower does not suggest this, as the pistil and stigma protrude a long way past the anthers, thus leading to the conclusion that one flower needs help from another.

" 13. The proposal to plant 9 ft. x 9 ft. referred to the *seedlings* raised—*not* to the parent plants which we proposed should be removed from any influence of outside fertilization by removal to Ooty, where they would of course have the highest possible culture—nor did we mean that the progeny from the parents would suffer by the high cultivation the parents received, but that the real qualities of the seedlings would show themselves better by ordinary culture.

" 2, 3, 5. The Chundrapore hybrids.—if *self* fertilized—can only be presumed to be from certain trees, unless there was only one liberica or arabica on the estate. We admit the results as mentioned by you are satisfactory in that these hybrids are resistant to leaf disease and probably rot, and, as such, are worth the trial you propose giving them. As you say, if found not to resist green bug they can be dug up.—Many estates on the Hills which pulled through most virulent attacks of " leaf," succumbed at once to green bug. We quite understand however that other districts than ours are interested in this experiment, so that bug resistance is not the only point though for us the most important one.

" 7. One reason for this question was that it was noticed that some of the insects on the flowers were very small and could easily have entered by a small hole and thus upset a lot of work.

" 9. In raising the pure types would not it be better to use seed from plants that have shown a good point or character, *e.g.*, on some estates there are certain trees, known to the Superintendents, which bear heavily and regularly year by year—this would help + *(a)*—a tree standing free of bug in a large field badly attacked would help + *(d)*—+ *(a)* would naturally help with 4 (c). This selection, which we admit means extra work, might and probably would, save years of work. We quite appreciate your position and anything that will save time might be tried, but the selection methods though tiresome and lengthy cannot but lead to the more satisfactory results. Would there be any objection to a few selected seedlings being placed under Mr. Butcher's direct supervision? The plants being in Ooty will not occupy any extra time, the only care being when flowering and the hybridizing has to be done. This would mean one day or at the most two. At Benhope a heavy shower of rain will put an end to the whole work under protection; in Ooty this cannot happen. A large umbrella made of palmyra leaves such as the coolies use—could of course be put over the tree, and we think it advisable to provide for this. The two proposals, *viz.* plants in the block, and plants in Ooty, might be considered.

"11. Maragoguipe is a most unsatisfactory plant—the leaves are very thin in texture and leaf disease gets hold of it at once—it is also a poor bearer up here—though the quality of the bean is we believe excellent, and in size much larger than arabica. Arabica might improve the weak constitution.

"13. We quite agree that for parents 12' x 12 is not a bit too close, as room must be allowed to get round the plants."

Extract from a letter dated 17th May from the Scientific Officer to Messrs. C. Grey and P. Beaver.

"With regard to your comments upon my replies to your questions, I will keep to the original numbers as you have done in order to render reference easy.

7. "I think it is certain that Coffee is self-fertilising if it fails to get fertilised by insects. Many flowers are arranged for self-fertilisation as a last resource. In the case of Coffee the stigma matures first and is protruded from the flower as the latter opens. At this stage the stamens are immature and lie close against the style. The stigma is mature and receptive and at this stage the flower is ready for cross fertilisation. The spreading lobes of the stigma offer a convenient alighting place for an insect and if this insect is covered with pollen some is almost certain to be dusted upon the receptive lobes of the stigma and if the pollen came from another tree cross fertilisation is effected. After a few hours the stamens mature and turn back, the anthers split and expose the pollen in a position to dust a visiting insect. The stigma in this case is already fertilised and so no more pollen has any effect on it. Suppose however that the flower did not receive an insect visit before its anthers matured. An insect then visiting it would probably dust the stigma with pollen from the anthers of the same flower and self-fertilisation would take place. Again suppose the flower does not receive an insect visit at all while it is open. Does not the stigma in that event curve back until the lobes touch the open anthers and thus fertilise itself? This is what happens as a last resource in the case of many flowers but I am not certain of the point in coffee. Many Coffee flowers must be self-fertilised in some years when insects are few I think.

"However this may be, the blossom is designed for insect fertilisation and it is actually fertilised by bees, wasps and flies of various sorts. Small beetles and thrips are often found crawling about the flowers and these no doubt aid in fertilisation. In the case of hybridisation work a net over the tree is ample protection from visits of insects. An insect when there are many flowers to visit will take no trouble to try and overcome an obstacle like a net you will find, but leaves it and goes to other trees. Again a flower crossed by hand is safe as after the pollen has been placed upon the stigma the latter very quickly loses its power of reception of more pollen and the anthers are cut off at the time. When trees are to be self-fertilised we desire the flower to get no pollen except that from the particular tree itself. Insects from outside which may have visited other trees are to be excluded by the net. Pollen clean bees may be introduced purposely to do the work. I consider that a good mosquito net is sufficient protection and I found that it excluded *all* insects when I used it at Chundrapore.

13. " I misunderstood your meaning, not realising what you meant by 'trial blocks.' I agree that the seedling hybrids should be tried strictly under estate conditions, but I think they will have to be planted quite 10 x 10, if not wider, on estate practice, as they grow into such big spreading trees and they will close in at that distance. I think however that the best planting distance for our hybrids when we have got them is one of the many side issues we shall have to decide by direct experiment.

"2, 3, 5. I do not think you quite grasp the line of work done at Chundrapore. A hybrid exists (tree B it is called) which we consider near the ideal and sufficiently near to be reproduced for estate purposes at Chundrapore (not necessarily anywhere else) without further improvement. Therefore we netted this tree to ensure that it was fertilised by its own pollen only. No insects got in the first year but last year pollen clean bees were introduced, and they spent most of their time trying to get out instead of visiting flowers. The trees bore heavily the first year, which proves, by the way, that Coffee blossom can fertilise itself. This seed was sown in big nurseries and the plants selected, all those coming true to the parent being taken and the rest destroyed. The size, shape, colour, and venation of the leaf were used as distinguishing characters these being markedly different between hybrid and hybrid I find.

" Now the point is that tree B has been reproduced, and I want to try it on the Nilgiris to test its bug resistance. As far as Chundrapore is concerned we are content with it for the time being till we can make a better.

9. " You are quite right but I am anxious to start work. Too much time has been wasted already. The nurseries are ready, the plot is ready, and I have completed 3 years of my term of 5 for which the Government have lent me to the U.P.A.S.I. I do not feel inclined to postpone planting up my pure types while someone, over whom I have no control, starts selecting seed. If you can get me selected seed next year I shall be only too glad to have it, but I wish to make it quite plain, that I want "to get a move on," and I feel sure that you will sympathise with me in this point of view.

With regard to special work at Ooty I quite agree, but please remember that we have no permission to use the Ooty gardens in any way. If Mr. Butcher agrees all well and good. There is another point and one which I laid stress upon when endeavouring to get the land out of the Government. On our own plot we can ensure continuity of purpose. Mr. Butcher may any day get promotion and a Curator will come to Ooty "who knows not Joseph" and he may not be as keen as Mr. Butcher is on doing extra work for the love of it, and years of our valuable work may be lost.

11. I hope that it may be possible to add the vigour and yield of Arabica to the quality of the Marigogipe bean which is high and commands a good price in the market."

Extract from a letter dated 21st May from Messrs. C. Gray and P. Beaver to the Scientific Officer.

"7. We thank you for the full description of how coffee blossom is fertilized. We have noticed that very often the corolla with the anthers slips and slides down the style and it is probable, as you say, that fertilization takes place in this way too by the anthers touching the turned back lobes of the stigma.

"13. Speaking for ourselves we are both in favour of distant planting and do not consider 9' x 9' or 10' x 10 a bit too close for ordinary estate planting of arabica, so that if these hybrids have the spread you mention 12' x 12' will be a good distance to plant.

"2, 3, 5. Excuse us touching on this point again. We were anxious to know if the original parents, arabica and liberica, from which the hybrids started—had been selected—not the tree—a hybrid—from which the present hybrids were raised. We are glad such success has already been attained, all that remains therefore is to fix this variety, which can be done on the lines you are carrying out, *viz.*, selection. We do not think there will be much trouble with Mr. Butcher, as we are sure he will help all he can, and having plants under his eye daily will mean the saving of a lot of time and work. We can ask our Honorary Secretary to address Government on the subject. The plant would not long remain in Ooty—Seedlings being raised at Benhope would after selection go to Ooty, be there cultivated and cross fertilised—the seeds grown there in the trial block and the experiment continued from these. With Mr. Butcher in Ooty there is just the possibility of being an hour too late to do the hybridising, unless he is able to spend 2 or 3 days at Benhope. In this experiment there are many "pros and cons" and we trust you will excuse our laying so much stress on the 'cons' as they present to us the difficulties to be provided against."

Extract from a letter dated 23rd May from the Scientifie Officer to Messrs. C. Gray and P. Beaver.

"2, 3, 5. With regard to the outstanding point under these questions. I beg to refer you to the Hon. Mr. J. G. Hamilton's account of the work done at Chundrapore with Coffee Hybrids which you will find on p. 54 of the Book of Proceedings of the U.P.A. 1910. From that you will see that the history of the original hybrids was unknown and that they were only indirectly selected. The point is that the present existing hybrid referred to in my previous letters, however obtained, is a good one and much better than any Arabica and this can now be reproduced.

"Please do not apologise in any way for laying stress on the 'Cons' of this problem. I assure you I have enjoyed discussing matters with you and I am delighted to give you all the information at my command. I am very glad indeed to find that you and your Association are so keenly interested in the matter and I feel sure that with your help and patient work we shall obtain results which will aid the Coffee industry."

THE BATAVIAN RUBBER EXHIBITION, 1914.

It has been stated by the Netherlands Indies Agriculture Syndicate that arrangements have been made to hold an International Rubber Congress and Exhibition at Batavia in April, 1914.

The Planters' Chronicle.

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THE U. P. A. S. I.

(INCORPORATED.)

A Still for Camphor.

(Concluded.)

[In the *Planters' Chronicle*, Vol. VII, No. 15, p. 237 a correspondent asked for drawings of a camphor still. Mr. L. Lewton-Brain, the Director of Agriculture in the Federated Malay States, in reply to a letter the Scientific Officer wrote to him on the subject, has most kindly sent a Bulletin recently published by his Department which contains an account of recent experiments in Malay with the distillation of Camphor, together with a description of a still designed for the purpose and drawings. Unfortunately it is not possible to reproduce these drawings in the *Chronicle*, but a reprint of a lengthy extract from the Bulletin describing the still and the results obtained with it is concluded in this number, and Mr. Anstead will be happy to forward tracings of the drawings to any planter who wishes to obtain them.]

YIELD OF PRUNINGS PER ACRE FROM TWO-YEAR-OLD-TREES.

The total weight of prunings from 888 two-year-old-trees planted 10 feet by 10 feet at the Experimental Plantations, Batu Tiga, Selangor, F. M. S., amounted to 6,663 lbs. or approximately 3 tons, giving a yield of about 0·65 per cent. of camphor and oil consisting chiefly of camphor, calculated on fresh green prunings. This gives an average yield of 7·5 lbs. of prunings per tree.

In the experiments with the two year old plants from Batu Tiga, the plants were cut down to a height of 4 feet, trees under this height, of which there were less than one per cent., being left untouched.

The average height of these plants was about six feet, the tallest tree being over ten feet and the smallest slightly under four feet.

The total yield of prunings per acre from a single pruning from trees planted 10 feet x 10 feet thus amounts to rather more than 3,300 lbs. or say 1½ tons. The yield from one pruning from one acre planted 8 feet x 8 feet should be 5,250 lbs. or 2¼ tons.

YIELDS OF PRUNINGS PER ACRE FROM FOUR-YEAR-OLD-TREES.

The total weight of prunings from 351 four-year-old-trees planted 10 feet x 10 feet at the Experimental Plantations, Kuala Lunpur, Selangor, F.M.S., amounted to 9,320 lbs. or approximately 4·1 tons, also giving an average of 0·65 per cent. of camphor and oil (consisting chiefly of camphor) calculated on fresh green prunings. The average weight of prunings per tree thus amounts to 26·5 lbs. The yield from one pruning per acre planted 8 feet x 8 feet should be approximately 8·2 tons.

As these trees were considerably taller than the two-year-old-trees at Batu Tiga they were only cut down to a height of about 6—7 feet, and all big stems over ½ inch diameter were rejected.

YIELD FROM THREE-YEAR-OLD-TREES.

It is recommended that pruning be commenced in the third year, although it may be found safe to prune during the second year after planting out. A yield of about 5 tons per acre in one pruning should be obtained, or say 15 tons in three prunings. The actual yield of prunings from second and subsequent prunings will be less but the camphor yield will not be decreased, as subsequent prunings will yield chiefly leaf with very little woody material, and since the woody material only yields 0·2 per cent. of camphor and oil the decrease of yield per acre due to this, will be very slight.

Calculating from yield of leaf only, an acre of three year old camphor planted 8 feet x 8 feet, *i.e.*, 700 trees per acre, should yield about 60 lbs. of camphor from one pruning or 180 lbs. per annum in three prunings.

The cost of collection of subsequent prunings after the first, will be considerably decreased, as less prunings will be obtained, yielding a higher percentage of camphor, since, assuming a yield of 1 per cent. of crude camphor from prunings consisting chiefly of leaf, only 10,000 lbs. of prunings will be necessary to produce 100 lbs. of camphor, instead of 15,400 lbs. which yield 0·65 per cent of camphor and oil.

COST OF COLLECTION AND DISTILLATION.

Cost of Collection.—It is comparatively easy to estimate the cost of collection from these experiments, by observing the quantity of prunings a number of men were able to collect per day.

The following were actual results obtained in practice :—

1. Six coolies in one day collected 1,796 lbs. costing $1·80
2. Five „ „ „ 1,393 lbs. „ 1·50
3. Five „ „ „ 1,524 lbs. „ 1·50
4. Five „ „ „ 1,768 lbs. „ 1·50

The cost of collecting sufficient prunings, *viz.*, 15,400 lbs. to produce 100 lbs. of crude camphor (assuming a yield of 0·65 per cent.) is, therefore, as follows :—

1. $15·50 per 100 lbs.
2. 16·50 „ „
3. 15·10 „ „
4. 13·05 „ „

In actual practice this could probably be reduced to two-thirds or even less, as in the above experiments all the prunings were carefully collected and tied into bundles from each batch of four or five trees and weighed. This would be unnecessary in practice. Secondly, in subsequent prunings, less woody stems would be obtained, reducing the cost of collection without materially reducing the yield of camphor, since the leaves as stated before yield 1·5 per cent. and the stems only 0·2 per cent. of crude camphor. The cost of preparing the material for distillation would be small, especially in the case of leaves, as these can be distilled whole. The prunings could be prepared very economically by mechanical means in a chaff-cutting machine.

A safe estimate for cost of collection would consequently be $14·00 per 100 lbs. of crude camphor, including transport to factory, which should be central, and preparation for distillation.

Cost of Distillation.—The cost of distillation would practically only include cost of fuel, and wages for one experienced coolie to control the distillations. It would be unnecessary to clean out the condenser and remove the camphor more frequently than once a week, involving very little labour.

Two distillations could easily be carried out in one day, using one ton batches of prunings.

It is not possible to estimate the cost of fuel for distillation with the type of boiler used in the above experiments, which was, by no means, an efficient boiler.

From the amount of water evaporated, however, in obtaining a definite quantity of camphor from a known weight of prunings, the quantity of fuel necessary in an efficient boiler can be ascertained.

In a series of distillations it was found that in obtaining 100 lbs. of crude camphor about 800 gallons of water were evaporated. With an average Indian coal in this country, costing $12 per ton, the amount of water converted into steam at 100° C in a fairly efficient boiler would be at least five times the weight of the coal consumed, *i.e.*, 800 gallons of water (8,000 lbs.) will require 1,600 lbs. of coal costing about $9. This figure is the highest limit, as I am of opinion that the quantity of water evaporated per 100 lbs. of camphor would be in practice considerably less.

The exact figure could not be worked out from theoretical considerations, as the necessary *data* were not available. A suitable type of boiler for the distillation process would be a vertical multitubular boiler such as the Cochran boiler, which is very efficient. A Standard Cochran of the following dimensions:—Diameter 3' 9", Height 8' 6", Heating surface 100 sq. feet., Grate area 7·5 sq. feet would be sufficiently large for a still capable of holding one ton of prunings, as, with easy steaming only, the amount of evaporation per hour is 54 gallons of water.

The total cost of production per 100 lbs. of camphor is, thorefore, as follows:—

Cost of collection, transport, etc., of 15,400 lbs. of prunings	$14·00
Cost of distillation, fuel, etc., including boiler attendant...	10·00
Cost of packing, shipping, etc.	3·00
Total cost ...	$27·00
Market price of 100 lbs. of crude camphor ...	60·00
Profit per 100 lbs.	$33·00
Profit per acre of 700 trees with three prunings per year...	$60·00—$80·00

There is one interesting point in connection with the cost of distillation, *viz.*, the use of dried, instead of fresh prunings. The percentage of moisture in the green prunings is over 50 per cent., therefore, for every 100 lbs. of fresh prunings 50 lbs. of water have to be converted into steam. It would consequently be much more economical to distil dried material, as the experiments show that no loss of camphor occurs if the material is not dried in direct sunlight.

Scientific Officer's Papers.

C-II.—THE STRUCTURE OF FLOWERS.

The root, stem, and green leaves are the vegetative organs of the plant, and the work which these perform for the benefit of the plant is chiefly concerned with the maintenance of the individual which bears them. If all goes well sooner or later every plant will flower and produce a set of organs whose special functions are the reproduction of the individual. In these organs seeds are produced containing embryos capable of developing into a new generation of plants should suitable conditions and opportunities arise.

A section through a simple type of flower shows in the centre a stem-like axis which is a continuation of the flower stalk. Upon this axis are arranged a number of lateral appendages of which, as a rule, four distinct forms are present.

The lowermost of these appendages are green in colour as a rule, and five or three in number, or simple multiples of these. Each appendage is known as a *Sepal*, and the collection is called the *Calyx* from its cup-like shape. Immediately above these Sepals, and alternating with them, is a whorl of brightly coloured, variously shaped, leaves; these are known individually as *Petals* and the whorl is called the *Corolla*. Next above these is a whorl of modified leaves known as *Stamens*. Each consists in a simple type of flower of a thin, thread-like, stalk surmounted by a swollen head. The collection of stamens is called the *Andrœcium*. Occupying the highest position on the axis is the *Pistil* of the flower, a variously shaped and branched, thread-like organ which at its base is swollen into a more or less flask-shaped body known as a *Carpel*, in which the seeds of the plant are finally produced.

The colours and shapes of these different organs vary widely in different plants and they are used to a large extent by systematic botanists to separate the different orders of plants from one another and to distinguish different genera and species.

Although the flower of a plant appears different in many ways from any other part of it, it is in reality a form of simple shoot, or a stem with leaves upon it. The whole of its parts, however, have been modified to serve the purpose of seed production. A flower always occupies the position of a shoot; it arises either at the apex of a stem or in the axil of a leaf.

The individual members of each whorl of organs in a flower are sometimes all alike in shape and size, in which case the flower is said to be *regular*, but in many flowers this is not the case and some of the petals or sepals are larger than others, and the flower becomes *irregular*, while again in some plants some of the members described above are missing altogether and the flower is *incomplete*. In the vegetable world there is an infinite series of these variations and it is this which makes flowers objects of beauty and wonder and which, in the hands of horticulturists who by plant-breeding and selection foster particular variations, gives to our gardens such an infinite display of colours, shapes and sizes in flowers.

The calyx and corolla whorls are together known as the *Perianth* and they are not directly concerned in the production of seed, in fact they are the *non essential* parts of the flower. The calyx forms a protective covering for the rest of the flower when it is still a bud and it often falls off when the flower opens because its work is done. In some cases it is retained however, and takes a part in distributing the fruit containing the ripe seeds.

The Corolla is usually brightly coloured and it serves mainly as an attraction for insects which it will be seen later play a most important part in the formation of seeds. The stamens and pistil are directly concerned in the production of seed and are thus the *essential* parts of the flower.

A stamen usually consists of a more or less elongated thread-like portion called the *filament* surmounted by a thicker part called the *anther*. This anther consists of two elongated halves, or lobes, each containing a hollow chamber in which *pollen* is produced consisting of loose round or oval grains. When the flower opens the partition between the anther lobes breaks and the pollen is set free in the form of a dust-like powder.

The central part of the flower, called the *Gynæcium*, consists usually of three parts. First a swollen hollow basal portion called the *Ovary*, secondly a thin more or less elongated part called the *Style* at the Apex of which is, thirdly, the *Stigma*. Within the cavity of the ovary are small round or oval bodies termed *Ovules* which may later develop into seeds.

As a rule both the essential parts, andrœcium and gynæcium, are present in the same flowers as in the case in Coffee for example; but in some cases one or other of the essential parts are missing. There are several variations of this latter case possible. The stamens alone may be present, in which case the flower is male, or the pistil alone may be present when the flower is female. Again we may have both male and female flowers on the same individual plant, in the case of the Cucumber for instance, or male flowers only may be born on one plant and the female flowers on another individual plant.

In many plants the flowers are borne singly and terminally at the end of the main stem, or singly and laterally in the axils of the foliage leaves of the stem or its branches. In most cases, however, flowers are grouped more or less compactly together on a special shoot of the plant, and such a shoot with its flowers is called an *Inflorescence* of which the "may pole" of the Agave is an excellent and well-known example in this country.

A very great variety of forms of inflorescence are met with differing in their manner of branching, and in many other particulars, in fact like flowers themselves, the method of their arrangement is infinite in its form and beauty.

RUDOLPH D. ANSTEAD,
Planting Expert.

NOTICE TO CORRESPONDENT.

" Stumped." Your letter is held over till next week's issue.

EXPERIMENTAL TEA GROWING IN SUMATRA.

According to the *Malay Mail* of May 22, 1912, Messrs. Harrisons and Crosfield have been experimenting in tea planting on their estates in the Tebing Tinggi district. They evidently think it a favourable crop, for it is said that from an experimental 500 acres on Tebing Tinggi Estate they will increase the area to 1,500. Naga Koeta Estate and Kota Siantar will also receive attention. Other companies, too, according to rumour, have their eyes open regarding this industry and before long, the above contemporary observes, we may find tea an important factor in our planting circles here.

REPORTS OF COMPANIES.

Indian Peninsula Rubber and Tea Estates.

The second annual ordinary general meeting of the Indian Peninsula Rubber and Tea Estates, Limited, was held on Monday, May 20th, at the Offices of the Company, Mincing Lane House, 59, Eastcheap, E. C., Mr. H. P. E. Drayton (chairman) presiding.

The Chairman said:—"From the printed accounts you have before you, you will observe that our income from produce harvested amounted to the respectable figure of £13,700 for the twelve months under review, as against £11,560 for the previous thirteen months. This increase is accounted for by the excellent coffee prices obtained, of which you have been advised. With the other small sources of revenue, detailed in the accounts, the total receipts amount to £14,018. The average gross price realised for the prepared coffee was £76 per ton, but, taking the whole crop, including strippings, gleanings, and triage coffee, which are sold locally at lower prices, and deducting freight, influence, sale charges, and commissions, the net amount realised was £65 10*s*. per ton—a price which we have reason to congratulate ourselves upon. The expenditure on coffee cultivation, including cropping expenses and seven-eighths of the managerial and general expenditure charged against revenue, comes to £37 10s. per ton, so that we get an absolutely net profit of £28 per ton on the coffee. The gross price realised for rubber was 4*s*. 9*d*. per lb., net price 4*s*. Owing, however, to the 1910 stock on hand at the commencement of the year being estimated on too conservative a basis for the purpose of the 1910 accounts, we get the benefit of a further 8*d*. per lb. on the 1911 crop. Taking all revenue, cultivation and harvesting charges, with one-eighth of the managerial and sundry revenue charges, the rubber cost works out at 3*s*. 10*d* per lb. This high cost is accounted for by the fact that, in order not to burden capital expenditure too much, the proportion charged to revenue is rather above that strictly chargeable. This is a conservative policy, which I am sure will commend itself to you. A comparison of the past year's accounts with those of 1910 shows that, though our revenue from produce has increased by more than £2,000, our estate expenditure in gathering and preparing the crops, including a proportion of management and general cultivation charges, has decreased from £8,900 to £7,789, and this although the proportion of management expenses is heavier in 1911 than it was in 1910.

PARALAI ESTATE.

As, no doubt, many of you are aware, we regard our Paralai Estate, the tea estate, as being practically independent of our other estates, and I will, therefore, divide our expenditure into two, *viz*., Paralai and the rest. The total expenditure on Paralai was £9,786, of which £1,724 has been written off to revenue, and the balance of £8,062 to capital. The total expenditure on the other estates was £9,095. Revenue has been charged with £6,085, and capital with £3,010. It will, therefore, be readily seen that we have charged about two-thirds of the expenditure on the estates, other than Paralai, to revenue. The whole of the expenditure on coffee has been charged to revenue, and about a quarter of the rubber charges. This works out above the proportion strictly chargeable in relation to the number of trees tappable, but, as I have said, your Directors think it inadvisable to burden capital expenditure too much. The greater part of the expenditure on Paralai Estate was on the tea clearings, which, as they were not bearing in the year under review, are, of course, chargeable to capital, as also is the rubber expenditure for the same reason. This estate is by far the largest of your properties, and we have the greatest hopes of its success. Our visiting agents are strongly impressed with the possibilities of Paralai, and urge that all the money we can spare be spent on the development of this place. This is also the view of your Directors, and it is our intention to spare no effort in the endeavour to obtain as early as possible good returns for the capital expended, and to make the estate a thorough financial success.

PROFITS OF THE YEAR.

The gross profit for the year was £5,516. We have thought it well to obtain a clean sheet as soon as possible, and we have, therefore, written off the whole of the underwriting commission and the balance of the preliminary expenses. Also, in view of the fact that the company has been incorporated for something over two years, it becomes necessary to make some provision for depreciation of buildings and machinery. We have, therefore, set aside £500 from profit and loss account as a reserve fund for this purpose. Income tax, £482 0*s.* 2*d*., has also to be deducted, leaving a balance to the credit of the profit and loss account of £1,535 8*s.* 4*d.*, which we propose to carry forward. It is no, doubt, rather disappointing to some of you to have to forego a dividend, but at the present stage it is, undoubtedly, the best and soundest policy to write off all outstanding items in connection with the formation of the company before making any distribution of profits. You have now before you a perfectly clean balance sheet, with a credit to profit and loss account of £1,535, and, beyond making further reasonable provision for depreciation, the profits of future years will be available for distribution.

CULTIVATION.

As regards cultivation generally, I have very little to add to the information contained in the circular sent to you in March last. Our long-standing quarrel with the Clerk of the Weather has been continued, and we were treated to a three months' drought at the commencement of the year, a tremendous burst of rain, in two instalments, in June and July, accounting for 75 per cent. of the total rainfall of the year, and then a practical cessation of the monsoon. This accounts for the failure to complete the year's tea-planting programme. The balance of the cleared land will be planted this year, and a start should have been made by now if the weather is normal. A word of explanation is necessary in connection with this clearing. In last year's report the extent of the prepared land was given as 710 acres, on information supplied by the Manager. Later reports, however, state a portion of this was composed of swamps and steep faces unsuitable for planting, and the balance remaining after deducting the 177 acres planted in 1911, is now estimated at 450 acres. The greatest care has been taken to ensure success in the planting that was done. Each plant put out has been shaded with bark, both in the case of the new clearing and the supplying of the 1910 planting, and recent reports speak favourably of the way the plants are coming on. When it was found to be impossible to complete the year's programme, every effort was made to get the place in proper order for 1912 planting. Some 18¼ miles of roading was done, 18 in. pits dug and the estate thoroughly cleaned of weeds. Seed has been laid down in the nurseries, and is stated by the Manager to represent some 3,000,000 plants; which should be ample to complete the programme and supply previous planting. A further 120 maunds have been ordered for delivery in November of this year, and should provide about two million more plants for future supplying, possible sales, etc. As regards yields, a modest beginning will be made as soon as the factory is completed, and we expect to get something over 100 lbs. made tea per acre from the 189¼ acres planted prior to 1910. When I tell you that other estates in the immediate neighbourhood are pro ducing up to 1,000 lbs. per acre from their mature tea, you will realise what our ultimate expectations are, and the excellent growth and appearance of our older tea lead us to believe that we shall not be disappointed. Your Directors have every confidence that Paralai will develop into a very fine tea property. The factory, that is being put up, will cost about £2,000, with machinery, when completed, and is of sufficient size to deal with out-crops for the next three or four years. It will be so constructed that extensions can be built on without interfering with the present structure.

RUBBER.

I have not much to say as regards rubber beyond what was said at the last general meeting, and the further information contained in the circular that was sent to you. The results of the year run fairly close to estimate, and would have been much better but for the fact that all the labour was utilised in coping with a rush of coffee crop when the latex was flowing most freely. The slow rate of growth has already been spoken about, and is certainly disappointing, but you must always remember that the fact that as long as the rubber keeps thin we are getting very satisfactory revenues from the coffee. As the shade from the rubber gets dense the coffee must gradually go. This is a compensating element that must not be lost sight of, especially in view of the large revenue we have obtained from coffee this year, which accounts for practically the whole of our profit. You must not take it that we are in any way pessimistic over our future rubber prospects. Returns are somewhat delayed owing to growth being slower than was anticipated, and this had been found to be the case on other properties at our high elevation, the bulk of the rubber being at 3,000 ft. elevation or thereabouts. Our visiting agents, however, are quite satisfied with the appearance and health of the trees, and the Manager writing recently intimated that with the new trees to be brought into tapping, our estimate of 6,750 lbs. for 1912 should be easily exceeded. The number of trees over two years old is estimated at well over a quarter of a million, and, in addition, a very large number of quick-growing Ceará trees was planted in 1910 as a precaution in case anything should happen to the coffee, which at that time, you will remember, was seriously threatened with green bug. At last year's meeting a suggestion was made by a shareholder that an effort should be made to secure some return from the vendors in respect of short rubber yields, as against prospectus estimates. I may say that we have had the best advice that such a claim could not succeed, as the estimates were made tn good faith. We have, therefore, taken no further action in the matter. We have every reason to be satisfied with the coffee results for the year. In spite of the drought we obtained the excellent crop of 191 tons. This would have been much larger had normal weather prevailed, as the out-turn of prepared coffee from the parchment was some 20 per cent. smaller than in other seasons. The quality was also affected, the berry being rather badly drought-nipped and the percentage of triage coffee somewhat large.

The estimate for 1912 is 168 tons, but we have not received definite news from all the estates as to the results of the blossom, so this figure must be taken as tentative. It is thought, however, that it will be fairly close to the mark. One very good piece of news I have to tell you is that green bug has been much less troublesome than in the previous year, when you will remember some £2,000 was spent in fighting the pest. The Manager attributes this to the appearance of a rapidly spreading white fungus which annihilated the bug wherever it went. It is hoped that the fungus will make its appearance again this year, and save us all further expense in connection with this most costly work.

THE LABOUR QUESTION again gave trouble, but was more encouraging towards the close of the year. The usual measures have been taken to secure a sufficient force for this year, and we hope that the requirements of all the estates will be satisfied. As regards general organisation, the native superintendents have all been replaced by Europeans, of whom there are two on the Nilgiris and two on the Shevaroy and one on Manalore, all under the control of the general Manager, Mr. Nicholson. Paralai has a separate organisation of its own, a highly experienced superintendent with two European assistants, under the direct control of the visiting agents, Messrs. Barber and Pascoe, who make frequent visits to the estate and generally manage the place. I think I have now given you all the information in my power, and will only add that your Directors are quite satisfied with the year's working, and have every confidence that the Company had good prospects in front of it. I now beg to move that the accounts and report be received and adopted."

Mr. E. G. Windle seconded the report, and said: "As one of the largest share-holders and vendors I should have liked to see a dividend paid, but I am at one with the Directors in the conservative policy which has been adopted in paying off preliminary expenses and underwriting charges, and consequently having a clean sheet in future. In our allocation of expenditure to capital and revenue we have also been conservative. We have paid off more against revenue than we need legally have done. We thought it a good thing to do, because we were conserving our capital account. As regards the out-turn of rubber, that is a matter that has disappointed us all, and I am sure you will like me as a vendor to deal with that point. In planting at the elevation we did it was originally an experiment. The first rubber planted was planted among young coffee, and grew up with it. It has a good chance, and did extremely well, much better than we expected some eight or nine years ago. We then extended the rubber through the old coffee. The old coffee was more or less in the shade, and the growth of the rubber in the shade did not correspond with the growth of the rubber in the open. That is the reason to which we attribute the non-production to the extent we originally anticipated. When we found the extent to which the shade affected the rubber, we naturally considered the point of reducing it, but we had to bear in mind that coffee requires shade, and if we reduced the shade that had been planted for the benefit of the coffee too rapidly, we should seriously diminish out catch crop, on which we depended so much in the meantime. We did reduce the shade; some of our superintendents think too much, and nobody says we have not done it sufficiently. The growth of the rubber during the past year has been much better than previously, and the prospects are more encouraging. The trees which were grown in the open when tapped gave us good results, and the trees now coming into bearing are improving in yield steadily. I think we may be sure our rubber is going to do us well, but at the same time we are very chary of giving you an estimate unless we are perfectly certain it will be fulfilled. As regards tea, I have no fear. The oldest tea we have got was planted on the Paralai Estate, in which I had the largest interest, some eight or ten years ago. We only planted five acres at the time, and on this five acres many of the bushes when I left India had a surface diameter of eight feet. On an adjoining property tea has done extremely well. Two years ago an adjoining estate got a yield of 1,000 lbs. per acre, and without making a too sanguine forecast, there is no reason why we should not get a very high yield ourselves. It has been a disappointment that we were not able to finish our planting programme at the date of our report as we anticipated, but it has been solely due to the monsoon failing us in the middle of our planting season.

But for that we should have had 1,200 acres opened last year. This will be finished within the course of the next two or three months."

Mr. Dixon asked whether having regard to the number of trees over five years' old, and to the result of the experimental tappings, the estimated yield of 6,500 lbs. would not be exceeded.

Mr. Windle explained that the first trees planted were planted in the open at an elevation of 3,000 feet, and the later trees were planted in the shade, with the result that they did not grow so well.

Mr. Dixon asked if they would have got more rubber had they had more labour, seeing that the chairman had stated there was a shortage of labour when the latex was flowing most freely?

Mr. Windle said there would have been a considerable increase in the output had there been more available labour.

Mr. Duck expressed his gratification that the Directors were so sanguine as to the ultimate prospects of the Company. He wished to know whether the Directors had taken any steps to approach Mr. Stanes, who was responsible for the original report in the prospectus. He would like to hear what Mr. Stanes' view of the estate now was. He did not wish to cast any reflection upon directors whom they knew were capable men in rubber and tea. There had been a blunder somewhere, and they had been misled. Who was it who took a too glowing view of the possibilities of the estate? Mr. Windle had admitted his mistake, but it appeared to him the Company was over-capitalised, and he regretted to hear that nothing had resulted from the suggestions made at the last meeting that the vendors should return some of the purchase consideration. He noticed they had spent £50,000 in two years out of capital and revenue. Where had it gone? What was there to show for it? He would like to know how much had gone in management. He would also like to know the position of Mr. Nicholson. Was he Manager or visiting Agent? Had his contract been renewed, and when did it expire?

Mr. Windle said he had spoken to Mr. Stanes about his report. Mr. Stanes was Manager for a large company under similar conditions to their own, and on various estates he had rubber planted in the same way. He said his estimates of yield on his own place had disappointed him in the same way as theirs had. Mr. Nicholson was Manager of the estates with the exception of Paralai. He was absent from the Estate on medical leave, and during that time Messrs. Barber and Pascoe acted as visiting agents. Mr. Nicholson's absence did not add to the cost of the management. The figures with reference to the amount spent on management out of the £50,000 referred to by Mr. Duck would be sent on to him when they had been extracted from the accounts. He pointed out that the estates were capitalised at only £38 per acre.

The resolution was put to the meeting, and the Chairman declared it carried unanimously.

Mr. Windle proposed the re-appointment of Mr. P. K. Read as a Director, and pointed out that he was connected with a well-known firm in the tea trade, and was of great assistance to the Board.

Mr. Herbert Wright seconded, and the resolution was agreed to. —*India-Rubber Journal.*

Central Travancore Rubber Co.

The Directors of the Central Travancore Rubber Company, in their annual report, state that the extent of the estate, as per the Company's title, is the same as at the close of the previous year, *viz.*, 2,028 acres, 71 cents. The actual acreage, per measurement is 2,033·11 acres. Of this acreage, 1,407, 25 acres are planted with rubber and 22 acres with tea. The capital expenditure on the estate for the year was £7,318 1*s*. 7*d*. This includes a sum of £369 1*s*. 6*d*. written off during the year in respect of advances to coolies now considered irrecoverable. This coolie advance account is now on a more satisfactory basis. The amount expended by the company to December 31st, 1911, on captial account in respect of the above acreage was £43,794 11*s*. 11*d*. No difficulty has been experienced with labour during the year, and the Directors are informed that no difficulty on this head is anticipated in the future. The growth of the rubber continues satisfactory. Manuring and forking of parts of the estate were attended with excellent results, and it is intended to continue this policy during the current year. The weeding of the estate is not now giving any serious trouble. The rubber crop secured during 1911 was 8,917 lbs. dry rubber. This compares with an estimate of 13.000 lbs., the decrease being mainly attributable to the directors' instructions that no trees should be tapped till they attained a girth of 18 inches at 3 feet from the ground. The quality of the rubber was quite satisfactory. The gross average price realised for the crop was 4*s*. 10·59*d*. per lb. The estimated crop for 1912 is 32,500 lbs. dry rubber. During 1911, 55 acres of the reserve was planted up, 33 acres with rubber, and 22 acres with tea. The Directors propose to continue the planting of tea, and have authorised the planting of 75 acres during 1912. The Directors have given out a contract for the erection of a permanent rubber factory. It is expected the building will be completed within the next few months. The necessary engine and additional machinery will be installed at a later date when the increase of crop renders this necessary. The issued capital of the company at December 31st, 1911, was 45,000 shares, which are now all fully called up. In January, 1912, the unissued balance of 5,000 shares of £1 each of the company's capital was offered, *pro ratâ*, to the shareholders at 10*s*. per share premium. The offer was satisfactorily responded to, and the money thus available will provide for capital expenditure on the estate for some time. The amount at the credit of profit and loss account is £1,177 4*s*. 7*d*. Out of this balance, the Directors have written off the preliminary expenses of the formation of the company, £410 16*s*. 9*d*. The Directors recommend that no dividend be paid, and that the balance of £766 7*s*. 10*d*., be carried forward, subject to Directors' fees. The whole cost of administration in this country during the year has been debited to revenue. Mr. T. B. Jones, one of the Directors, visited the estate in December last, and on his return expressed himself as well satisfied with its condition.

Nilambur Rubber Estates.

The Directors of the Nilambur Rubber Estates in their annual report state that the expenditure in India on the three estates during the year 1911 amounted to £6,854 1*s*. 6*d*., as against £4,194 17*s*. 4*d*., in the previous year, and the expenditure in London was £1,309 17*s*. 11*d*., as against £1,660 8*s*. 9*d*., a decrease of £350 10*s*. 10*d*. The amount received for interest and transfer fees was £179 1*s*. 4*d*., as against £750 19*s*. 4*d*. In January last a detailed report on the estates by Mr. John Aird, the manager, dated November 29th, 1911, was sent to all the shareholders, and the Board are pleased to be able to state that since that report was made, the progress of all work has been quite satisfactory, and that the estates are in good order. On the Nirpuzha Estate 198 additional acres were cleared and planted with Pará rubber, and the planted acreage is now as follows:—Glenrock, 537 acres; Nirpuzha, 535; and Munderi 342; or a total of

1,414 acres, containing 149,417 trees. As stated in the Board's circular of January 12th last, Messrs. Barber and Pascoe, the visiting agents, reported that they expected to be able to tap a small number of trees this year. They now estimate that the yield will be about 1,500 lbs. of rubber. This amount, though small, brings the company to the producing stage, and an increased yield may be expected annually until the whole planted area is in full bearing. The season has been unusually dry, but, notwithstanding this, the rubber is doing well, though the supplies put out last year, more especially on Nirpuzha and Munderi, have suffered somewhat from the continued drought. The latest advices are to the effect that rain has now fallen and the supplies are coming on well. During the year 30 acres were planted with tea, and a further 100 acres have been cleared and are being prepared for planting during this monsoon. This work has progressed satisfactorily, and pitting and contour draining and the making of roads is well in hand. Work should be completed in good time for the coming planting season. Nurseries have been made, and the plants are making good growth. The supply of labour has shown a marked improvement.

It will be remembered that the Munderi property was purchased with the view of resale, and it is hoped now that the vacancies on the acreage originally planted have been supplied and the estate got into a good state of cultivation, to shortly form a subsidiary company to acquire it, when a satisfactory profit on the transaction should result.

Malayalam Rubber and Produce Co.

The Directors of the Malayalam Rubber and Produce Co., Ltd., in their annual report, state that the crops harvested were as follows:—Rubber; 36,101 lbs. against an estimate of 31,000 lbs., and 12,555 lbs., harvested during 1910. The inclusive f. o. b. cost was 1*s.* 3·12*d.* per lb., and the net average price realised was 4*s.* 8·12*d.* per lb. The crop was secured from approximately 327 acres, giving 2 yields of 110 lbs. per acre. Tea: 1,041,100 lbs. against an estimate of 1,180,000 lbs. and 1,086,765 lbs. secured during 1910. The inclusive f.o.b. cost was 4·66*d.* per lb. and the net average price realised was 6·95*d.* per lb. The crop was secured from approximately 2.038 acres, giving a yield of 510 lbs. per acre. Cardamoms: 35,019 lbs. against an estimate of 60,000 lbs. and 56.610 lbs. secured during 1910. The cost was 9·56*d.* per lb., and the net average price realised was 1*s.* 6·72*d.* per lb. Coffee: 630 cwts. were harvested at a cost of 22*s.* 5*d.* per cwt. and realised a net average price of 36*s.* 4*d.* per cwt. The shortage in the tea and cardamom crops was due to the excessive drought during the early months of the year. During the year 736 acres of the reserve land were opened and planted up with rubber, and 410 acres with tea. It is expected that a further 500 acres will be opened and planted up in rubber and 550 acres in tea during 1912. The estimates crops for 1912 are as follows:—Rubber, 117,500 lbs., tea, 1,100,000 lbs.: cardamoms, 45,000 lbs.: coffee, 200 cwts. The labour force at the end of the year numbered 6,733, with outstanding advances amounting to £6,142, which are stated by the managers to be good and recoverable. Mr. George Nicol Thomson has visited the estates on behalf of the Board, and in his report dated December 12th, 1911, he states that the general condition of the estates is satisfactory. The net profit for the year ended December 31st, 1911, was £16,889 13*s.* 2*d.*, to which has to be added the amount brought forward from 1910, £4, 105 15*s.* 6*d.*, making £20,995 8*s.* 8*d.*, out of which the Directors propose to pay a dividend of 6 per cent., less income tax, absorbing £17,619 15*s.* 7*d.*, and in payment of interest in vendors' account, £393 15*s.*, leaving to be carried forward £2,981 18*s.* 1*d.*

The Planters' Chronicle.

RECOGNISED AS THE OFFICIAL ORGAN OF THE U. P. A. S. I., INCORPORATED.

VOL. VII. No. 27.] JULY 6, 1912. [PRICE As. 8.

THE U. P. A. S. I.

(INCORPORATED.)

The International Rubber Exhibition, 1911.

Contributions to the Association's Fund in connection with the above Exhibition proved to be in excess of requirements. After meeting all expenses a surplus remained that permitted of a refund being made to all contributors in the proportion of 2 annas 4½ pies per rupee subscribed.

The following payments have, therefore, been made:—

		Rs.		
To the Government of Madras	Rs.	445	5	0
„ „ „ Travancore	„	74	3	6
„ „ „ Cochin	„	44	8	6
„ Malabar Coast Planters' Association ...	„	332	8	0
„ Shevaroy „ „ ...	„	74	13	0
„ South Mysore „ „ ...	„	6	15	7
„ Kanan Devan „ „ ...	„	3	11	4
„ South Travancore „ „ ...	„	84	15	7
	Rs.	1,067	0	6

The Exhibition account has been closed.

Cash Balances in London.

Under date June 17, 1912, the Secretary, Karachi Chamber of Commerce, wrote to the U. P. A. S. I.:—

"I am directed by my Committee to invite your attention to the attached note of the 10th instant (Circular No. 1-1912) on the subject of the present excessive Cash Balances held in London by the Secretary of State for India.

"These figures are quite separate from and exclusive of the balance held in London on account of The Gold Standard Reserve—which, my Committee believe, amounts to nearly £19,000,000.

"The retention of these colossal balances in London appears to my Committee to be contrary to the best interests of India. At the present time, when more capital is urgently needed for the development of India's railways, canals and other public works, and when for the attainment of these ends, this country could well afford to pay four or even four and half per cent. for capital, my Committee are unable to see the advantage of withdrawing many millions sterling from India for investment in London in securities bringing in a much lower return and in most of which the peoples, trades and industries of this country are in no way concerned.

"I am to enquire if your Chamber can see its way to lend its support to a joint protest to Government against excessive cash balances being retained in London by the Secretary of State."

[INCLOSURE.]

Circular dated June 10, 1912.

"The *cash balance* held in London by the India Office on behalf of the Government of India has increased in the last five years from four-and-a-half millions sterling to close upon eighteen millions sterling. The exact figures are as under :—

On 31st Dec. 1907	£ 4,607,266	(Exclusive of the Gold Standard Reserve).
,, 1908	7,983,898	,, ,, ,,
,, 1909	12,799,090	,, ,, ,,
,, 1910	16,697,245	,, ,, ,,
,, 1911	15,292,638	,, ,, ,,
On 8th Mar. 1912	17,953,995	,, ,, ,,

In the absence of any legitimate need for this colossal cash balance, the Secretary of State has lent the money to various financiers and banks in the City of London with and without security at rates approximating 2½ per cent. per annum.

"On the 10th May 1912, Mr. G. A. Touche, M. P. asked the Secretary of State for India to whom the money had been lent. Mr. Montagu's reply was that £6,915,000 had been deposited with seven (London) banks without security; £10,100,000 had been lent to approved borrowers; and the balance was held on current account with the Bank of England. . . . . "*The Secretary of State does not consider it desirable to publish the names of the approved borrowers.*

"The unnecessary withdrawal of nearly £18,000,000 from India where capital is badly needed, and where bankers and financiers would probably be prepared to pay 4 or 5 per cent. for it, and its loan at half these rates of interest secretly to London financial companies who are probably not directly concerned in the development of Indian commerce and industries, appears to be an irregularity that calls for the strongest possible protest. It is suggested that all Chambers of Commerce in India be asked if they are prepared to make a united protest against these methods of India Office finance.

"In the mean time it may be noted that the Secretary of State notwithstanding his cash balance of over seventeen and three qnarters millions sterling, has recently *borrowed* £3,000,000 in London (at a heavy discount) on behalf of the Government of India."

Indo-European Trans-Persian Railway.

Under date June 18, 1912, the Secretary, Karachi Chamber of Commerce wrote to the U. P. A. S. I. :—

"I am directed to invite your attention to the enclosed Circular No. 2-1912 on the subject of the representations made by this Chamber in support of an early construction of the Indo-European Trans-Persian Railway.

"In view of the fact that the completion of this railway will not only afford rapid and cheap means of communication and transport between the great industrial centres of India and the markets of Persia, but will also bring the United Kingdom and India within a week of each other, thus immensely facilitating the carriage of the mails, the development of passenger traffic and the progress of the whole country, my Committee hope that your Association will be able to give this great trunk railway project its hearty support."

[INCLOSURE.]

Circular dated June 11, 1912, giving the following extracts from representations made by the Committee of the Karachi Chamber of Commerce:

Extract No. 1 from the Address presented to His Excellency the Viceroy at Government House, Karachi, on the 12th April 1911:—

. . , . The question of linking India with Europe by means of a Trans-Persian Railway is now engaging the attention of European financiers. The Chamber notice that the proposal has taken the form of connecting the Russian Railways of the Caucasus with the Indian Railway system at Nushki. We would respectfully submit for Your Excellency's consideration that the best route for such a line of communication would be by way of Bam, Southern Baluchistan (*i.e.*, Panjgur) and Karachi. This route would have the advantage of tapping fertile country and, moreover, would find its terminus in a rising commercial seaport. . . . .

Extract No. 2 from Lord Hardinge's reply to the above address:—

. . . . . "It is impossible to say at present whether or when the proposed Trans-Persian Line will become a realisable project. The present situation in the South of Persia is not one which offers much encouragement to capitalists to finance such schemes, but the question of the construction of this line has been under the serious consideration of the Government of India; and the claims of Karachi as a terminus of a line passing through Southern Baluchistan have not been lost sight of . . . ."

Extract No. 3 from the Chamber's letter No. 44 of the 23rd January 1912 to the Secretary to the Government of India, Foreign Department, Calcutta:—

. . . . . I am directed to inform you that my Committee have had under consideration the question of the locality of the break of gauge in the proposed Trans-Persian Railway.

It has been noticed that statements have appeared in the English and Russian Press and have been telegraphed to India to the effect that the seaboard of the Persian Gulf at Charbar or Bunder Abbas would be an appropriate point at which to locate a break of gauge in the proposed trunk Railway from the Caucasus to Karachi.

My Committee dissent from this view. They are strongly of opinion that the interests of British trade demand that the break of gauge (if such be unavoidable) should not be allowed to occur at any point south of the Russian sphere of influence as defined by a line drawn at Kasr-i-shirin to the north-west corner of Afghanistan through Ispahan and Yezd.

I am to beg that you will be so good as to transmit this view to the Supreme Government.

Extract No. 4.—Letter dated Calcutta, 6th February 1912, from the Deputy Secretary to the Government of India in the Foreign Department, to the Secretary to the Karachi Chamber of Commerce.

I am directed to acknowledge the receipt of your letter No. 44, dated the 23rd January 1912 regarding the locality of the break of gauge in the proposed Trans-Persian Railway.

2. Your communication has been forwarded as desired to His Majesty's Government.

Extract No 5.—Letter No. 338 of 28th May 1912 from the Chairman, Karachi Chamber of Commerce, to the Secretary to the Government of India, in the Foreign Department, Simla.

With reference to this Chamber's letter of 23rd January, I have the honour to inform you that the Committee of this Chamber have had under consideration the question of the route through Southern Persia of the proposed Trans-Persian Railway to India.

The Committee are of opinion that it will be to the best interests of both India and Great Britain if the line be carried from Karachi to Teheran by the shortest and most direct route possible. Such a route would not only pass through the most populous towns and wealthy portions of southern Baluchistan and Persia—namely Panjgur, Bam, Kerman, Yezd and probably Ispahan—but by reducing the length of the line, cost of transport, and the time occupied in transit, it would encourage to the utmost that through traffic upon which the success of the line will largely depend.

If for political reasons it be deemed necessary to carry a portion of the southern section of the line along the coast of Baluchistan, then this Chamber would urge that the coast section be kept to the smallest possible length. The port and town of Pasni would appear to be a suitable point at which to leave the coast and so serve a comparatively fertile portion of Makran. If for engineering reasons, Pasni be found unsuitable, then some point a little westward of Pasni might be selected. But this Chamber would urge most strongly that the line be carried inland before it passes out of British territory. Jewni on the eastern shore of the Bay of Gwettar is, in the opinion of this Chamber, the uttermost point to which the line should be carried out of its direct route from Karachi to Bam, Kerman and Yezd.

It follows from the above that this Chamber is altogether opposed to the Trans-Persian Railway being carried along the coast from Karachi as far as Bunder Abbas. Indeed, my Committee can see no reason whatever for going to the expense of serving Bunder Abbas at all by a Railway. From Pasni or Gwettar Bay, Kerman could be reached by mail in less than a day, and from Karachi, in well under two days. In these circumstances, and looking to the absence of natural resources at Bunder Abbas as a Port, this Chamber can see no grounds whatever for carrying the Trans-Persian Railway to Bunder Abbas.

In conclusion this Chamber would press upon the attention of Government the desirability of a very early construction of the Trans-Persian Railway as the most practical, the least expensive, and most certain way of solving the problem of establishing peace, security and better Government in Southern Persia. Railway and irrigation works have had a marked effect in quieting and reforming the more turbulent tribes and individuals on certain parts of the north-western frontiers of India. And my Committee urge that similar results would probably follow the construction of a great trunk line of Railway through Southern Persia. Not only would the expenditure of money in Persia have a certain settling effect on the nomads and turbulent tribes who now derive a livelihood from extortion and robbery, but the creation of a line of railway would give to the Persian authorities that means of easy and rapid communication and transport without which the suppression of disorder in a country like Persia would be a matter of extreme difficulty for any Government, however strong.

All which being so, the Chamber beg that the Government of India will be so good as to transmit these views to the Secretary of State for India; and my Committee trust the Government of India will be able to see their way to accord to this Chamber's representation their most valued support.

DISTRICT PLANTERS' ASSOCIATIONS.

Central Travancore Planters' Association.

Minutes of an Extraordinary General Meeting of the above Association which was held at Glenmary Bungalow on Wednesday, 5th June, 1912.

PRESENT.—Messrs. F. Bissett (Chairman), F. W. Winterbotham J. H. Ellis, W. G. Haslam, A. R. St. George, W. A. J. Milner, J. S. Wilkie, R. P. Roissier, H. C. Wastaway, J. A. Richardson, F. C. Forbes and MacKenzie.

The notice calling the meeting was then read.

Election of Members on Committee.—Mr. McArthur having resigned his place on Committee and Mr. R. E. Haslam having also resigned as Honorary Secretary, the Chairman ordered election of members to fill these vacancies and the result was as follows—

Committee	... Mr. H. C. Westaway.
Honorary Secretary	... Mr. R. P. Roissier.

Correspondence.—Read letter from the Chief Secretary to Government No. 1894 of 24/4/12 and it was resolved: "That the Honorary Secretary do write to Chief Secretary to Government asking that vehicles passing the toll twice in 24 hours be exempted from a charge on the return journey."

Read letter from Honorary Secretary, Mundakayam Rubber Planters' Association of 7/2/12 and it was resolved: "That the Honorary Secretary do write to Honorary Secretary, Mundakayam Planters' Association and send a copy of our labour rules and inform that Association that we do not see any reason to change them at present."

Read letter from Secretary, U. P. A. S. I., No. 16/12 26/4/12. Read letter from Mr. Ormerod, Secretary, U.P.A.S.I., *re* his resignation of 2/5/12. Read letters from Honorary Secretary, Kanan Devan Planters' Association of 18/5/12 and 21/5/12. Read letter from Secretary, U. P. A. S. I., No. 18/12 of 20/5/12 annual meeting of the U.P.A.S.I. and enclosing preliminary draft of Agenda paper and asking if there are any subjects to be added and it was resolved: "That Tobacco Importation Duty into Travancore be added." Also "That Honorary Secretary be instructed to write to the British Resident asking if Tobacco which has already paid duty into British India is liable to duty in Travancore." Read letter from Secretary, U. P. A. S. I. of 25/5/12. Read letters from various estates in district giving their cart hire rates and Honorary Secretary was instructed to make a copy. Read letter from Sub-Division Officer, Peermade, 151 of 18/5/12. Read letter from Honorary Secretary, Kanan Devan Planters' Association of 8/4/12.

District Roads.—Read letters from Sub-Division Officer No. 150 of 18/5/12 and No. 151 of 18/5/12.

Mannan's Creek Bridge.—Read letter from Chief Secretary to Government No. 2209 of 9/5/12 and the Honorary Secretary was instructed to send a copy to the Superintendents of Estates interested.

Resolution by Mr. J. A. Richardson—Mr. Richardson proposed "That in future all district rates for Estate labour, Factory, Cart hires, Carpentery and Masonry be revised once a year and that a list of rates be drawn up and brought before the next General Meeting of the Association for confirmation and then circulated amongst the members." Seconded by Mr. T. C. Forbers. Carried unanimously. With a vote of thanks to the chair the Meeting terminated.

(Signed) REGINALD P. ROISSIER,
Honorary Secretary.

Anamalai Planters' Association.

Proceedings of a half-yearly General Meeting of the Anamalai Planters' Association, held at the Puthutottam Bungalow on Monday, the 17th June, 1912.

PRESENT.—Messrs. G. A. Marsh (Chairman), B. A. Marden, Norman Grey, C. Howland, H. W. deSalis, J. H. Ireland Jones, J. O K. Walsh, E. N. House and J. Hatton Robinson (Honorary Secretary). *By Proxy.*—Mr. G. L. Duncan. *Visitors.*—Mr. M. E. Platt, P. W. D., and Mr. H. M. Foulton (Messrs. Walker, Sons & Co., Colombo).

1. *Delegates to the U. P. A. S. I. Meeting.*—Mr. Marden proposed and Mr. Howland seconded: "That Messrs. Marsh and Robinson be asked to represent the Association at the meeting." These gentlemen consented to attend the meeting, if they could possibly do so. It was further decided that should Messrs. Marsh and Robinson be unable to attend the meeting, Mr. C. H. Brock be very kindly asked to represent the Association.

2. *Minor Forest Produce.*—Mr. Duncan's views on this subject and letters from the District Forest Officer were read to the meeting, and after some discussion the matter was left to the Honorary Secretary of the Minor Forest Produce to deal with.

3. *Hospital and Township Sites.*—The Collector of Coimbatore's letter No. 585 of the 6th June 1912, was read. It showed that Government was adverse to the Hospital being built on the originally selected site, and suggested a site on the main road between the Valparai and Monica Estates. The selection of a suitable site is a very "sore" subject and has been before the Association many times lately, and although everybody present voted for Mr. Marsh's proposal it cannot be said that it was altogether popular, still, nobody else proposed an alternative site except Mr. Robinson, who mentioned that he considered the high land nearby the 29th milestone an excellent situation for the Hospital and future Township, but this possible site was not discussed, and as Government had called for an early reply, the matter could not be left over. Mr. Robinson then seconded Hr. Marsh's proposition, which was put to the meeting and carried unanimously. Proposed by Mr. Marsh and seconded by Mr. Robinson: "That the meeting was of opinion that it was best to fall in with the lines suggested by the Collector, and that they agreed to the Hospital being built on the site selected by him. Further, that they were entirely at one with the Collector's suggestion that the land between the two rivers, recently provisionally granted to Mr. Simcock's Company, be retained by Government with a view to the possible needs of the future. and, that should this land be ever thrown open Mr. Simcock's Company have first claim to it."

4. *Hospital Affairs.*—As Mr. Duncan, who everbody regretted was unable to attend the meeting, owing to ill-health, was mostly interested in this item, it was resolved that it should stand over until he could personally attend a meeting.

5. *Access to New Estates.*—Owing to several representatives being away, it was resolved that this matter also stand over until another meeting.

6. *Issuing of Warrants.*—The Honorary Secretary was instructed to write to the Collector and ask why Mr. G. L. Duncan, whose name had been sent up in January last, had not already been gazetted as a Special Honorary Magistrate?

7. *Postal Affairs.*—The Honorary Secretary was instructed to again remind the Post Master General of his letter of the 2nd March 1912, enclosing a copy of that letter, also to protest against the conduct of the present Post-master, and to press for the immediate construction of a new Post Office.

8. *Cooly Wages.*—Owing to the enhanced rates of labour prevailing in the District many maistries were now trying to get pay for many of their coolies that were not in the least eligible for such payments. It was proposed by Mr. Robinson and seconded by Mr. Ireland Jones: "That the Managers and Superintendents and Writers in charge of Estates do personally fix the proper rates for all their labour, and further that coolies who are quite well and who do not work for 6 days every week, shall have their 'Rice Orders' reduced at the rate of 2 annas for each day that they do not work."—Carried unanimously.

9. *Roads.*—It was pointed out that although the present time of year was most suitable for the consolidation of metal practically nothing was being done on the roads in the District, the 3 branch bandy roads, in particular, being in a most appallingly disgraceful state. that from the 27th to 32nd milestone being in the worst state of the three, but all of them being almost impossible for wheeled traffic. The Honorary Secretary was requested to write to the Assistant Engineer, Coimbatore Sub-Division, and to send a copy of his letter to the Superintending Engineer.

10. *U. P. A. S. I. Secretaryship.*—On hearing of the resignation of the Secretary, the Chairman and Honorary Secretary of this Association sent a letter to Mr. Abbott sympathising with him for the temporary inconvenience he would be subjected to; the letter was read to the meeting and endorsed by it. Mr. Abbott's letter of the 11th instant to the Vice-Chairman and Councillors, U. P. A. S. I., was read and the contents upheld by the meeting.

Mr. Marden proposed and Mr. Grey seconded a hearty vote of thanks to the Chairman, Mr. Marsh, whose hospitality was very much appreciated by the meeting.

The Honorary Secretary desires to thank all the resident members of the Association for their very generous subscriptions to the *Titanic Fund.* The List amounts to Rs.162-8-0, and £10 16s. 8*d.* has been remitted home to the MANSION HOUSE FUND—opened by the Lord Mayor for the relief of distress caused by the loss of the *Titanic.*

(Signed) J. HATTON ROBINSON,
Hony. Secy. & Treasurer.

Coffee growers in Porto Rico are preparing to make another attempt at enlarging and improving their markets in the United States. Porto Rico produces from 30,000,000 to 45,000,000 pounds of coffee a year, but has never succeeded in securing a good market in the United States, and recent years have been less and less. Most of the coffee from Porto Rico, which went to Spain under the Spanish régime, still goes either to that country or to Vienna. In those markets it brings a better price than in the United States, where it sells in competition with Santos, whose market quotation is often from 2 to 3 cents a pound below the Porto Rican product. Earlier efforts at making a market by popularizing the island's coffee were for various reasons unsatisfactory. The new plan proposes a roasting plant in New York.—*Spice Mill.*

CORRESPONDENCE.

The Soil.

Sir,—I am enclosing you a cutting from the *Evening Standard* on a subject that may interest many planters and which I think you might publish in the *Chronicle* to see what comments can be drawn. In these days when this so-called Stump rot and fungus diseases are showing up in increasing patches year after year, and Science has instilled into us that it is madness to move our soil where there is a natural mulch covering the ground, (though we have thousands of rotting shade roots and stumps all over our Estates) I question very much if we have not been misled, and that we have been on the wrong tack, most of us now for many years, and had we never given up the old method of cultivation with forks, we might have less to complain of in the way of these diseased patches). Referring to the cutting where it says " His contention is that soil does not need enriching, that all soils, the richest as well as the poorest, contain sufficient fertilising material to insure good crops "—one certainly finds it impossible to believe such a statement; but the rest of the article may be worthy of our attentions.

Madapur, 20th June, 1912. Yours faithfully,

" STUMPED."

[INCLOSURE.]

POISONED GROUND.

American New Theory of Gardening.

All our ideas as to action and interaction of soil and plant are shaken by the theory put forward by Mr. Milton Withney of the American Department of Agriculture.

Arguing from what takes place in the animal creation, where the system automatically gets rid of matter for which it has no further use, such matter being by that time of a poisonous nature; he argues that the roots of plants get rid of noxious gases, which gradually poison the soil all round the roots. The effect of stirring the soil is to liberate these gases and bring them to the surface. The transplantation of the tree or shrub or plant has, of course, the same effect.

There never has been any doubt as to the value of transplanting flowers and shrubs, especially roses, but it was always supposed that the benefit arose from their removal out of an exhausted soil to one that contained the necessary food. According to Mr. Withney, that is a mistake, and he backs up his argument by an experiment which is certainly a telling one. He sowed some wheat in a pot. When it had grown, ripened, and been harvested, he sowed some more wheat in the same pot, adding some fertilisers. Theoretically, the second crop, having received this additional food, should have equalled the first; but it did not, says " Le Journal," in describing the experiments, and the third crop was still more inferior. Mr. Withney then took this pot of apparently exhausted soil and added to it an antiseptic, pyrogallol, which has no feeding value whatever. Marvellous to relate, the next crop of wheat—the fourth—was as good as the first, and the fifth and sixth were equally good.

THE DISEASE OF A SOIL.

His contention is that soil does not need enriching, that all soils, the richest as well as the poorest, contain sufficient fertilising materials to ensure good crops. What they want is to be cured of the diseases bequeathed by previous crops; the poisons must be counteracted. Natural and artificial manures do this to some extent unsuspected by the user of them, but a much more certain and economic method of dealing with the malady is to attack it straight away with a medicine.

Mr. Withney asks us to observe the analagous procedure of nitrifying bacteria which gradually create an environment fatal to themselves. So, too, alcoholic ferments are asphyxiated, as it were, by the results of their own energies, when they have created an environment containing 15 per cent. of alcohol.

One or two facts are worth mentioning as bearing on the American theory. One is that rose-growers are more and more insisting on the necessity for keeping the surface soil well stirred. Fruit-trees, too, grown in grass, never do so well as when grown in open soil. Another fact Professor I. B. Balfour mentioned the other day at the Royal Horticultural Society: in land continuously wet, so that it can never be aerated, the acidity is such that plants growing there seem half paralysed; they have difficulty in absorbing any of the abounding fluid. Lastly, it is a well-known fact that roots' secrete acid in forcing their way through the ground, the acid dissolving the soil. There is, then, a good deal to be said for the American theory.—W. A. F. in the *Evening Standard.*

NOTE BY THE SCIENTIFIC OFFICER.

I have before me the Bulletin containing the theory put forward by Mr. Milton Withney which is quoted in the extract from the *Evening Standard* forwarded by "Stumped." I also have before me the copy of an address read before the Botanical Society of America and the Botanical Section of the American Association for the advancement of Science by Mr. C. G. Hopkins, on 27 December, 1911, answering the contentions of Mr. Withney very fully. This address has evidently escaped the attention of both the *Evening Standard* and "Stumped" and as it deals with the subject in a much more able way than I can hope to do, I propose to quote extensively from it. Mr. Hopkins said:—

"Briefly, it might be said that for nearly a century the world of science has accepted and taught, and the world of advanced agricultural methods has practiced, the doctrine that soil fertility maintenance and soil enrichment require the restoration or addition of plant food, including particularly phosphorus and nitrogen, which are most likely to become deficient in normal soils, potassium where needed and sometimes lime or limestone, which always supplies calcium, and magnesium as well if dolomitic limestone be used. Of the other five essential elements, carbon and oxygen are secured from the carbon dioxide of the air, hydrogen from water, and iron from the inexhaustible supply in the soil; while the sulphur brought to the soil in rain and otherwise from the atmospheric supply, resulting from combustion and decomposition of sulfur-bearing materials, supplemented by the soil's supply and by that returned in crop residues, appears to be sufficient to meet the plant requirements and the loss by leaching.

"After nearly a century of the increasing agricultural practice of this doctrine on much of the farm land of Germany, France, Belgium, Holland, Denmark, and the British Isles, those countries have approximately doubled their average acre-yields. The ten-year average yield of wheat in the United States is 14 bushels per acre, while that in Europe has gone up to 29 bushels in Germany, to 33 bushels in Great Britain, and to more than 40 bushels per acre in Denmark. The annual application of phosphorus even to the soils of Italy has already become greater than the phosphorus content of all the crops removed. The exportation of our highest grade and phosphate rock from the United States to Europe now exceeds a million tons a year, carrying away from our own country twice as much phosphorus as is required for the annual wheat crops of all the states, and millions of acres of farm land in our own Eastern States have already been agriculturally abandoned, because of depleted fertility and reduced productive power; so that it is now impossible for our Congressmen to enter the capital of the United States from any direction without passing abandoned farms."

Now if we turn to the practical side and consider the results which have been obtained at Rothamsted, we shall find ample evidence that fertilisers are necessary to produce good crops year after year, and that Mr. Withney's statement that "soil does not need enriching and all soils, the richest as well as the poorest, contain sufficient fertilising material to ensure good crops" does not find support from actual field results. Thus:—

"Where wheat has been grown every year since 1844 on Broadbalk Field at Rothamsted, England, the average yield for fifty-five years has been 12·9 bushels per acre on unfertilised land, 35·5 bushels where heavy annual applications of farm manure have been made, and 37·1 bushels per acre where slightly less plant food has been applied in commercial form.

"Barley grown every year on Hoos Field at Rothamsted has produced, for the same fifty-five years, an average yield of 14·8 bushels on unfertilised land, 47·7 bushels with the farm manure, and 43·9 bushels where much less plant food was applied in commercial form.

"Potatoes grown for twenty-six consecutive years, also on Hoos Field at Rothamsted, produced as an average, 51 bushels per acre on unfertilised land, 178 bushels where farm manure was used (reinforced with acid phosphate during the first seven years) and 203 bushels where plant food was applied in commercial form. The first year of the investigation the unfertilised land produced 144 bushels, land receiving farm manure alone produced 159 bushels, and land fertilised with commercial plant food produced 328 bushels per acre.

"Director A. D. Hall, of the Rothamsted Experiment Station, makes the following statement on pages 95 and 96 of his book on "The Rothamsted Experiments":—

> "On the plots receiving farmyard manure, and even on those receiving only a complete artificial manure, the crop was maintained in favourable seasons. No falling-off was observed which could be attributed to the land having become 'sick' through the continuous growth of the same crop, or through the accumulation of disease in the soil."

"In commenting upon these same experiments, Milton Withney, Chief of the United States Bureau of Soils, makes the following statement in *Farmers' Bulletin* No. 257, page 14:—

> "One of the most interesting instances going to show that toxic substances are formed and that what is poisonous to one crop is not necessarily poisonous or injurious to another is a series of experiments of Lawes and Gilbert—the growing of potatoes for about fifteen years on the same field. At the end of this period they got the soil into a condition in which it would not grow potatoes at all. The soil was exhausted, and under the older ideas it was necessarily deficient in some plant food. It seems strange that, under our old ideas of

> soil fertility, if the soil became exhausted for potatoes, it should grow any other crop, because the usual analysis shows the same constituents present in all of our plants, not in the same proportion, but all are present and all necessary, so far as we know. This field was planted in barley, and on this experimental plot that had ceased to grow potatoes they got 75 bushels of barley."

" If now, we turn to the actual records of the Rothamsted experiments we find that the first crop of barley grown after twenty-six years of potatoes was 33·2 bushels per acre on unfertilised land, only 24·8 bushels where minerals alone had been used and the soil depleted of nitrogen by the potato crops, 67 bushels per acre where minerals and nitrogen had been used, and 72·4 bushels where farm manure had been applied for twenty-six years. We also find, in strict harmony with Director Hall's statement, that the largest average yield of potatoes from the farm manure plots (3 and 4), either for one year or for five years, was secured after potatoes had been grown on the same land for more than 15 years."

Mr. Withney states in the *Farmers' Bulletin* No. 257 :—

" Apparently, these small amounts of fertilizers we add to the soil have their effect upon these toxic substances and render the soil sweet and more healthful for growing plants. We believe it is through this means that our fertilizers act rather than through the supplying of food to the plant." (Page 20).

" There is another way in which the fertility of the soil can be maintained; *viz.*, by arranging a system of rotation and growing each year a crop that is not injured by the excreta of the preceding crop; then when the time comes around for the first crop to be planted again the soil has had ample time to dispose of the sewerage resulting from the growth of the plant two or three years before . . . . . . Barley will follow potatoes in the Rothamsted experiments after the potatoes have grown so long that the soil will not produce potatoes. The barley grows unaffected by the excreta of potatoes, another crop follows the barley, and the soil is then in condition to grow potatoes again.

" In other experiments of Lawes and Gilbert they have maintained for fifty years a yield of about 30 bushels of wheat continuously on the same soil where a complete fertilizer has been used. They have seen their yield go down where wheat followed wheat without fertilisers for fifty years in succession from 30 bushels to 12 bushels, which is what they are now getting annually from their unfertilised wheat plot. With a rotation of crops without fertilisers they have also maintained their yield for fifty years at 30 bushels, so that the effect of rotation has in such case been identical with that of fertilisation." (Pages 21, 22).

Now this statement is to say the least of it incorrect. As Mr. Hopkins says :—

" If we turn to the Rothamsted data, we find the first recorded yield of wheat on the unfertilised plot on Broadbalk Field was not 30 bushels, but only 15 bushels; that the average of the first eight years was 17·4 bushels; that the best fertilised plot on the same field has averaged not 30 bushels, but 37·1 bushels for fifty-five years; that, as stated above, the wheat grown in rotation, following a leguminous crop, has averaged not 30 bushels, but 25 bushels on unfertilised land, and 34·8 bushels where fertilisers were applied for turnips three years before."

Mr. Hopkins concluded his address as follows:—

"A thousand additional proofs of the practical value and of the evident necessity of supplying plant-food in systems of permanent agriculture could easily be cited.

"All long-continued investigations, and likewise, all practical agricultural experience show that great reduction in crop yields ultimately occurs unless plant food is restored to the soil; and, as a rule, the chemical composition of normal soil is an exceedingly valuable guide in determining the kind of material which should be supplied in practical systems of soil enrichment and preservation."

We may take it then that the toxic theory is non-proven. and in the case of Coffee, rotation of crop is out of the question as a practical possibility.

As to the question of digging, it is possible that non-digging is being overdone. By 'digging' the scientist means the use of the fork or the mamotty, which turns over the soil to the depth of eight inches to a foot and cuts and kills the coffee roots. This is, in my humble opinion, at any rate, wrong. That it may be advisable if the labour is available to break up the top *inch* of soil under the mulch and replace the latter is a possibillity. On soils which rapidly dry out and cake, this practice before the blossom showers has much to be said for it. But this is not digging in the ordinary sense of the word.

How the cutting to pieces of the Coffee roots each year can prevent Stump Rot I fail to see. The fungus by such a method is well distributed through the soil and innumerable wounds are made on the Coffee roots to give it a ready entrance. I believe there are many Coffee estates where the old practice of an annual dig is still carried out. Are these estates more free of Stump Rot than any others and do they persistently bear heavier crops?

The way to control Stump Rot and similar root troubles, is to remove stumps of dead and dying shade trees, to isolate patches of Coffee attacked by the disease by means of open trenches, and to regularly and systematically lime the soil, and once more I would say manure the Coffee regularly and systematically and do not chop up the established roots any more than can possibly be avoided.

R. D. A.

A Consular report from Mexico states regarding the year 1911:—

The coffee crop this year is an average one and prices are very good. In the canton of Coatepec it amounts to some 70,000 cwts,, and in the cantons of Jalapa and Misantla to 25,000 cwts. A great deal of new planting has been done recently in the cantons of Jalapa and Misantla, and within the next two years the crop from these two cantons may be expected to double.

Oranges are now being very extensively planted, and as soon as proper facilities for exportation are arranged this district should become one of the great orange-producing centres of the world. The crop, which increses considerably every year, is for this year, beween 80,000,000 and 100,000,000 oranges. These were principally consumed in the Republic. although quite a brisk trade was done with New York in the early stages of the crop. The picking begins in September, this giving growers here an advantage over those in the United States.

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THE U. P. A. S. I.

(INCORPORATED.)

The Annual Meeting, 1912.

Several delegates having requested him to fix the date of the opening of the next Annual Meeting about the time the S. P. M. R. Camp will close, the Chairman of the U. P. A. S. I. has appointed the 12th August 1912 as the opening day.

Application has been made for the use of the Mayo Hall, Bangalore, as the place of Meeting, from the 12th to the 17th August inclusive.

Office and Laboratory.

From 1st August 1912 the Association will take over from its present Secretary the lease of the premises now occupied as an office, and will also take over the adjoining Laboratory premises.

The Secretaryship.

Mr. Fletcher Norton, well-known as a planter, has been offered, and has accepted, the Secretaryship of the Association, and is to assume charge of his new duties on the 1st August 1912.

The U. P. A. S. I. Exhibition.

Planters are reminded of this fixture, and are requested to send in their exhibits as early as possible next month, so that all arrangements may be made in good time. It is hoped that the Exhibition will synchronise, as usual, with the Annual Meeting.

This Exhibition will be the third of its kind and it is hoped that planters will make an effort to make it a success. In 1910 a very small Exhibition was held as an experiment. It proved so popular that last year the idea was developed and a fairly large Exhibition was got together and this provoked much interest and proved of a high educational value. Planters from districts wide apart meet during the Annual Meeting week and they are naturally interested to know and to see what kind of products districts other than their own can turn out, and an exhibition of these products affords a valuable opportunity for comparing notes and getting hints.

Last year there was a really good show of Rubber and Coffee but Tea was poorly represented. It is hoped that this year Tea planters from the different districts will send samples designed to show what South India is doing with the product for which she has lately made such a good name in the market.

The exhibits last year were afterwards transferred to a special section at the Mysore Agricultural Show where the Rubber was much admired. Whether this will be done this year remains to be decided and must largely depend upon the nature and quantity of the exhibits sent in.

Scientific Officer's Papers.

No. CIII.—REPRODUCTION IN PLANTS.

The essential feature of the sexual reproduction of both plants and animals is the fusion of two special kinds of cells, namely a male reproductive cell and a female reproductive cell, which after complete commingling of their parts give rise to a new cell capable of growing into a new individual organism. The two uniting cells, or *gametes* as they are called, are produced in special reproductive organs which are the essential parts of flowers; the male reproductive cell is enclosed within the pollen grains produced in the stamens, and the female reproductive cell lies within the ovule.

Pollen grains vary very much in form, size, and colour and they are very beautiful objects under a microscope. When a pollen grain is placed in a weak solution of sugar and kept at a suitable temperature it absorbs water and emits a slender tube-like structure; the nucleus which is present in it travels into this tube and takes part in the fertilisation process to be described presently.

The ovules are minute roundish bodies found in the ovary of the flower. At the apex of each ovule is a very narrow canal, known as the *micropyle*, and inside it is the female reproductive cell called the *ovum*, or egg-cell.

Now when a pollen grain is placed on the stigma of a suitable flower it germinates and produces a tube as it does in a solution of sugar as described above. This pollen tube penetrates into the tissues of the stigma, rather like a root growing into the ground, and so down through the style till it reaches the ovary at the base. This process takes anything from a few hours to a few weeks, depending on the kind of plant. When it reaches the ovary the pollen tube is guided in a way which is not altogether understood to the micropyle of one of the ovules and passes through it into the ovule itself. Here the end of the tube is dissolved and the male nucleus, the actual male reproductive cell, passes out and fuses with the female reproductive nucleus contained in the ovule, and a new plant is born. This fusion of the two cells, male and female, is the essential feature of the sexual act in plants, as in animals, and is spoken of as *fertilisation*. Unless the ovum is fertilised in this way both it and the ovule wither and die, but as soon as fertilisation is effected the ovum begins to divide and grow, developing into an embryo plant, the whole ovule finally becoming a *seed*.

After fertilisation has been effected the style and stigma have done their work, as has also the corolla, and these consequently wither and fall off, while the stimulus of fertilisation causes the tissues of the ovary wall to grow and the gynaecium of the flower becomes a fruit, in some cases a comparatively large body.

Only a single pollen grain is necessary to fertilise a single ovule and more pollen is always produced by flowers than is necessary for the impregnation of all the ovules within the carpels. In the case of flowers with more than one ovule it sometimes happens that not all are impregnated, and in consequence the fruit becomes one sided and unsymmetrical in form. A common instance is the formation of 'pea berry' in Coffee which is brought about by the fertilisation of only one of the two ovules in the ovary. The unfertilised ovule dies and the fertilised one takes up the whole space in the fruit, and lacking the pressure of the second ovule, becomes round instead of flattened by contact with the second 'bean.'

RUDOLPH D. ANSTEAD, *Planting Expert.*

DISTRICT PLANTERS' ASSOCIATIONS.

Kanan Devan Planters' Association.

Proceedings of an Annual General Meeting held in the High Range Club, Munnar, on Saturday, June 1st, 1912.

PRESENT.—Mr. C. Fraser (in the Chair), Messrs. W. J. Dixson, D. Mackintosh, A. Blair Hill, L. H. Ley, J. C. Swayne, J. M. Bridgman, G. E. Bewley, Dr. J. S. Nicolson, M.D., Messrs. M. C. Koechlin, W. L. Ranking, E. E. Williams, J. H. Jeffreys, H. W. Smith, S. H. Paulet, J. A. Gwyme, A. J. Wright, W. Mackenzie A. J. Imray, H. I. Pinches, A. H. Dixson, R. Hedger, E. R. Howlett, A. Yates, W. O. Milne and F. R. Westbrook, by their proxy Mr. E. A. Hughes.

Honorary Member:—A. W. L. Vernede, Esq.,

The notice calling the meeting having been read, the minutes of the last year's General Meeting having been printed and circulated, were taken as read and approved. The following agenda was then laid on the table:—

(1) Chairman's Speech.
(2) Honorary Secretary's Report.
(3) Accounts.
(4) Labour Laws.
(5) Post Offices.
(6) Theni Bridge.
(7) Game Laws.
(8) Scientific Officer.
(9) Local sale of Fluff and Refuse Tea.
(10) Bangalore Delegate.
(11) Vaigay Valley Railway Scheme.
(12) Correspondence.
(13) Roads.
(14) Election of Office-bearers.

On opening the Meeting, the Chairman said he was very pleased to see so many Members present. As there was a very long Agenda he asked the permission of the meeting to take the second item of the Agenda first. He did not wish to make a long speech and he felt the Honorary Secretary's report which was a full one, would explain the Association's work for the past year very clearly. If, after it had been read, there was anything he wished to make any remarks on, he would do so. This was agreed to.

The Honorary Secretary then read his report as follows:—

"Mr. Chairman and Gentlemen,—I shall endeavour to be as brief as possible in submitting a short summary of subjects dealt with during the year by the Association.

The following figures showing approximately the acreage under cultivation and outturn of produce are of interest to us all:—

The total acreage under Tea is now 17,047 acres, against 15,136 last year, roughly an increase of 2,000 acres. The total crop of Tea from the District was 8,204,697 lbs., as against 7,509,665 lbs. This is an increase of 9 per cent. which is very satisfactory and the outturn per acre compares most favourably with any other Tea district. The total area under Coffee is 1,028¾ acres and there are 795 acres of Cinchona. The above total includes 179,375 lbs., of green teas.

The Rubber in the district is gradually increasing its yield and very satisfactory prices have been obtained. There is a very promising future in front of this industry. Besides this, there are 1,610½ acres under Cardamoms, 429 Sisal, 114 Camphor, and 20 under Cocoa, all of which are progressing satisfactorily and giving good results. I regret I cannot give actual crop figures as they are not all yet to hand.

I am glad to say the year under review has been a most successful one for Tea. The average price obtained is the highest on record and the result has been extremely satisfactory to all concerned. Let us hope this happy state of affairs may long continue.

During the year ten Committee Meetings and the Bi-Annual General Meeting were held.

There is a proposal for discussion and settlement to-day with regard to the Local Labour Laws.

The Medical Grants have been regularly paid by the Government, and we are all very grateful to His Highness' Government for their generosity. The increase of cultivated area and the welfare of the coolies have necessiated the building of additional Dispensaries. Although, so far, Government has not seen its way to increase the Grant-in-Aid I hope that they may shortly do so.

I am sorry to say that progress with regard to the construction of the Theni Bridge has been most unsatisfactory. Although the work has been in hand for a long time past, a great deal still remains to be done and the whole District still suffers from the dislocation of traffic.

There are at present 30 Estates on the books, paying a subscription of Rs.10 each and a cess of 1 anna per acre on cultivated area. It is proposed to double this cess, as by doing so we will obtain the services of the Scientific Officer and come into line with all other Associations. I am sure you will all agree that this proposal is a wise one, for while we all know the district is extraordinarily fertile and most of the cultivated area is quite young, still we are bound to benefit by expert and scientific advice and help.

I regret that the Local Post Office working still remains most unsatisfactory. Owing to the action, or rather want of action, on the part of the British Government, the Postal authorities are not able to run the Mails, except during the hours of daylight, and in spite of our efforts and strongest protests, our postal facilities have been seriously curtailed. We have been told that the present arrangement is the best possible under the existing conditions. I am sure, however, you will all agree that the existing conditions are most discreditable to, and reflect very seriously on, the authorities concerned. It is almost incredible, seeing the importance and value of the interests concerned that Government cannot, or will not, arrange for the safe transit of His Majesty's Mails at any time and should allow such a disgraceful state of things to continue. I suggest, if our last appeal to Government does not lead to an improvement, the whole matter be brought up in Parliament. I am certain Sir J. D. Rees, who is a Director of one of our Companies, would be only too glad to take the matter in hand. In this connection, I would like to mention the continued efforts on the part of the S. P. O., Madura, to better things, but, of course, he can do little until Government acts.

The law for the better protection of Game in Travancore is making steady progress, and I think in a short time we shall arrive at a satisfactory arrangement. The recent Arms Regulation Act is a step in the right direction, and I am sure, has every one's approval.

The Fish Committee have continued their efforts to introduce Trout into the rivers and streams, and it is very satisfactory to be able to report that, in spite of all difficulties, their efforts have been successful.

The matter of the Cambum Valley Light Railway has been pressed on the notice of the Authorities, but, so far I regret to say, without much success. I hope, however, that continued effort in this direction may lead to a successful result and the district benefit by the construction of this much-needed work.

It was decided during the year that the Association join the L. A. N. Institute, and you will all be pleased to know that for our annual subscription, the Members (including their wives and families) are entitled to its benefits.

Mr. Martin was our representative at the Annual Meeting of the U. P. A. S. I., and it is needless to say he did his utmost to help and advance not only our own interests, but those of the whole planting community in South India. We are deeply indebted to Mr. Martin and I consider we should thank him very heartily for his help and continued effort with regard to our labour and interests generally. We all appreciate very highly the honour of Mr. Martin's election to the Vice-Chairmanship.

Mr. Wright was our Delegate at the Sri Mulam Popular Assembly. His efforts to forward our interests were most successful and we are all very much obliged to him for his good work. I hope you will confirm this latter.

The Association was instrumental in obtaining help for the son of one of its old Members from the S. I. P. B. Fund. I refer to the case of Edward Claridge.

The Association decided to include as Members, the heads of the Medical, Engineering and Transport Departments, and I am sure you will all agree we shall benefit by the advice and help of these gentlemen.

In placing the accounts before you, I beg to move a hearty vote of thanks to Mr. Gwynne, who kindly audited them. The books, papers, &c., are all on the table for your inspection. I have nothing further to say, Gentlemen, and in placing my resignation in your hands, I beg to thank the Committee and all Members very heartily for the ready help they have afforded me in carrying out my duties during the past year.

The Chairman then addressed the Meeting and said he was sure they were all very much obliged to Mr. Hughes—for his very thorough and careful report. The year under review had been a quiet and successful one, and conditions in the district generally, as the report shows, made steady progress and good work had been done by the Association. He regretted to inform them that although the work on the Theni Bridge had been going on for the past two years, the condition of things was very much worse than ever. He had a proposal on the subject to bring forward when he would say more about the matter. There are several interesting proposals on the agenda for consideration, notably the question of engaging the services of the Scientific Officer, Game Laws, and the Vaigay Valley Railway Scheme. He would not detain them longer and begged to propose that the Honorary Secretary's report be adopted. This was agreed to and carried unanimously.

The Honorary Secretary explained the financial position of the Association and the books were circulated for inspection. The position was considered satisfactory and the accounts adopted unanimously.

Labour Laws.—Mr. Bridgman then addressed the Meeting on the subject of Local Labour Law. He said that in his opinion, both Kanganies and coolies were trading upon their knowledge of six months limit in the low country, Rule 4, section 3. He found that Kanganies were in the habit of letting coolies go down to the low country and sending them up almost exactly to a day after the expiry of the limit and he thought that either the limit should be raised to one year or abolished altogether. He, therefore, proposed "that the period of 'six months' in para. 3 of Rule, 4 be altered to one year and given a trial for one year. In the event of there being no improvement, the limit be abolished altogether." This was seconded by

Mr. Gwynne, who said his experience was the same as Mr. Bridgman's, and thought a longer period would be an improvement. After some discussion the resolution was put to the Meeting and lost; only the proposer and seconder voting in its favour.

Post Offices.—Mr. Wright then read the following proposal:—

" That in view of the representations which have been received on the subject of the Post Office arrangements of the District since the Bi-Annual General Meeting on the 3rd of February, this Association desires to record its appreciation of the attention given to the needs of the District by the S.P.C., Madura, in doing all that seems possible to meet the wishes of the Association and the community generally under the existing conditions." This was seconded by Mr. A. Blair Hill and carried unanimously. The Chairman proposed "That the Honorary Secretary send a copy of the Resolution to the S. P. O., Madura," and this was agreed to *nem. con.* In this connection it was decided "That the Honorary Secretary again approach the British Government with reference to the carriage of the Mails, and in the event of their taking no action to ensure their safe conduct at any time, the matter be referred to Sir J. D. Rees, one of the K. D. H. P., Company's Directors, and that he be asked to kindly bring the matter to the notice of the Secretary of State for India, in Parliament."

Theni Bridge.—The Chairman proposed : " That this Association begs to draw the attention of the Government to the very unsatisfactory work put into the Theni Bridge and to the unnecessary delay and expenditure caused thereby, and that this Association does again earnestly request the Government to give this most important work its very immediate attention." Mr. Fraser said that although the work had been going on now for two years, only five arches had been completed, two of which had collapsed. One of these had again been re-built, and had again collapsed and only three arches are now standing. He understood Rs.27,000 out of Rs.30,000 sanctioned for the Bridge, had already been spent. He also understood that the Local Board had decided to pull down the present three arches and entirely re-build the Bridge as they had come to the conclusion that the bricks being used for the work were unsuitable. He felt that all would agree this was a most unsatisfactory state of affairs and hoped if this resolution was agreed to, that their representation to Government might result in this very important work being speedily and satisfactorily completed. The resolution was agreed to, *nem. con.* Mr. Bridgman proposed and Mr. Koechlin seconded " That a copy of the Resolution be sent to the Peermade Association, asking them for their support in the matter." This was agreed to, and carried unanimously.

Game Laws.—Mr. Koechlin then read the following proposed alterations and additions to Regulation 3 of 1073. To be added to clause 3 :— " Sambhur (Cervus unicolor). Immature males being in the case of Bison, 34 inches widest spread ; in the case of Ibex, 13 inches saddle backs only, and in the case of Sambhur, 28 inches length of horns." "That the number of heads to be shot in a season be in future limited to two Bull Bison, three Saddle Backs, four Sambhur Stags and three Spotted Deer Stags." "That no change be made in clauses 4, 5, or 6." "That there be added to clause No. 7 after the words Public Treasury—to the credit of the Travancore Game Preservation Regulation No. 3 of 1073." To be added to schedule No. 1 " that the above should include any part of the concession not falling within the specified boundaries." "That there be added to schedule No. 2 that the close season be altered to 15th of May—15th of September inclusive, instead of as it is at present, 31st of May—1st of October." After some discussion the Chairman proposed "That the Association ask Government to adopt the alterations suggested," and this was carried unanimously.

Scientific Officer.—**MR. HUGHES** then read the following Resolution:—

"That this Association, having first obtained the consent of the Directors of the various interests concerned, agrees to raise the extra cess required to obtain the services of the Scientific Officer."

He explained that this meant an increase of 1 anna per acre all round on cultivated area. The extra expenditure was so small and advantages that would be obtained so valuable, that he hoped all would agree to the proposal and the arrangement be carried out. The K. D. H. P. Co. had a Scientific Officer of their own some years ago, and the Association had therefore never joined the Scientific Officer Scheme, being the only one in South India that had not done so. He felt sure all would agree that the matter was one of the utmost interest and importance to them all The old methods were all very well and things had gone along all right so far, but scientific enquiry and methods had so greatly advanced cultivation and treatment of all products that if they wished to keep in the front rank and gain the utmost value from their various industries every advantage should be taken of the Expert's knowledge, advice and help. So far the District had flourished exceedingly, and blights, &c., had had little or no effect, but we could not hope this state of things could go on indefinitely. As the various Totes got older, blights would have more and more effect and tend to spread and the sooner scientific steps were taken to prevent this the better. There were the questions of manures, both chemical and in the form of green crops, methods of manufacture, &c., and here expert advice would be invaluable. They would also have the advantage of using a well equipped Laboratory for analytical purposes, &c., and the knowledge thus obtained must be of the greatest value to all concerned. He hoped the Meeting would agree to this proposal. Mr. Gwynne, before seconding the resolution, asked if steps had been taken to ascertain the wishes of the Managing Agents with regard to it. Mr. Hughes explained that he had written to all concerned and had received favourable replies. The proposal had been referred to the Directors of the K. D. H. P. Company and he now awaited their decision, but did not think there could be any doubt as to what it would be. Mr. Gwynne then seconded the resolution. The Chairman said he fully agreed with all Mr. Hughes had said and felt that if they wished to go on and prosper, they must keep up-to-date in every possible way. He could assure them that as far as the Malayalam Company was concerned the increased cess would be sanctioned. Mr. E. E. Williams also supported the resolution and said he felt sure the Scientific Officer's help and advice would be of great value. His interests would agree to pay the increased cess. He stipulated, however, that if engaged, any reports the Scientific Officer might make were to be treated as private and on no account to be published without the consent of the interested parties. All agreed to this, and after some discussion, the resolution was put to the Meeting and carried *nem con.*

Local Sale of Fluff and Refuse Tea.—The **CHAIRMAN** then read the following proposal:—

"That with a view to stopping thefts of Tea from Factories, the sale of Tea Fluff and Refuse, Bodi delivery, be discontinued, and that Superintendents be requested to obtain the necessary permission to do so."

He said that he felt the sale of Fluff, &c., opened the door to Tea-makers stealing good quality tea and sending it away mixed up with the Fluff. He had a case recently in his own Factory and thought that if local sales of tea were stopped altogether, it would make it very much more difficult for dishonest Tea-makers to dispose of stolen tea. He had seen so-called Fluff and Sweepings in Bodi that contained 50 per cent. of more or less good tea and was certain that if local dealers gave good prices for these grades, it was because it paid them to do so owing to the good tea they got with them. He thought this should be put a stop to and hoped the Association would support his resolution. Mr. Wright said that he thought they should be very careful in interfering with sales of tea locally as there was a profitable and growing trade in lower grade teas which he thought should be encouraged as far as possible. He pointed out that at present all sales at the Factories had been stopped as far as the K. D. H. P. Company and A. A. D. T. T. Company were concerned and that no sale could be effected until leave had been obtained from Headquarters and samples submitted. Most sales were for Kodaikanal Road delivery a few being for Bottom Station delivery.

He suggested that as fas as Fluff was concerned, sales should only be arranged with *bonâ-fide* buyers who used it for dyeing purposes, &c., and who would not object to its being denatured by the use of lime. Mr. Swayne agreed with the Chairman and thought open sales of Fluff and Refuse locally should be discontinued. A good deal of discussion took place and Mr. Hughes pointed out that if a Tea-maker was dishonest it was almost impossible to stop petty thieving. The only remedy was an absolutely reliable man. The resolution was then put to the Meeting and lost.

Bangalore Delegate.—The Chairman proposed "That Mr. A. Ff. Martin be elected as the Association's Delegate at the U. P. A. S. I. Meeting, any particular instructions to be given him later. This was agreed to *nem. con.*

The Vaigay Valley Light Railway.—Mr. Hughes then brought forward the matter of the Vaigay Valley Light Railway Scheme. He said that the Association could shew that if constructed, this railway would pay very handsomely, anything from 15 to 20 per cent. exclusive of a liberal deduction for depreciation, &c. He had written to the Government and South Indian Railway Authorities, giving these figures, &c., but had not got much satisfaction. The last letter from Government referred him to the Chairman of the Madura Local Board. Seeing how rapidly the districts it would serve and tap are growing and the increasing volume of traffic to be dealt with, he was certain they all agreed it was a work of the utmost importance and urgency to all concerned. A large sum of money had already been raised towards the construction by Government Kists and he felt that if a private Company could be formed to take up the work there would be no difficulty in obtaining the necessary capital. The scheme, however, was one of several in the hands of the South Indian Railway, and as it came 5th or 6th on the list, there was little likelihood of its being taken in hand for some years. The Peermaad Association promised to help as far as possible. Mr. Wright proposed :—

"That in view of the recent communications from Government, this Association approaches the Chairman of the Madura District Board, drawing his attention to the urgent necessity for the construction of this line and asking for information as to the future policy of his Board with regard to the scheme."

This was seconded by Mr. Ranking and carried unanimously. It was agreed that, in the event of the Madura District Board Chairman's reply not being satisfactory, a deputation from the K. D. P. A. and Peermaad Planters' Associations approach Government on the subject and endeavour to arrange for the immediate construction of the line.

Correspondence.—The two letters from Mr. Ormerod announcing his resignation were then read. The Meeting regretted Mr. Ormerod had resigned and agreed to support the U. P. A. I. in any arrangement they made for carrying on his work.

Mr. J. A. Richardson's letter, *re.* the recent Government regulations prohibiting the importation into Travancore of tobacco by post, was read and the Meeting decided to support Mr. Richardson in his efforts to have the regulation amended.

Roads —Mr. Hill then brought up the question of roads and regretted that in spite of all the Association's efforts they were still very far from being in a satisfactory state of repair. He complained particularly of the Northern Outlet Road, especially the Marioor-Chinnar section. This road had necessarily to be used for heavy traffic and in parts that particular section was almost impassable for heavy trolleys. He thought the Association should again approach Government and urge the importance of having the road put into really good order, with as little further delay as possible. Mr. Williams explained that the repair work done for the past three years on that part of the road had not been very good. Government were now working at it and had built several revetments and were spending a good deal of money generally. He now had the contract and had large quantities of metal, &c., ready. This would be laid down as quickly as possible and the road thoroughly repaired.—Recorded with satisfaction.

The Chairman and Committee having resigned, Mr. Vernede was voted to the chair during the election of new Office-bears. The following were elected:—Chairman—C. Fraser, Esq.; Honorary Secretary—E. A. Hughes, Esq.; Committee—Messrs. A. J. Wright, H. L. Pinches, M. C. Koechlin. A. J. Dixson and J. M. Bridgman.

Mr. Fraser having returned to the chair said he begged to thank them for the honour they had done him. He would do his best to forward the Association's interests. He was glad to see so many of the younger members present. At future meetings he hoped to hear more from them. There were many old heads on young shoulders and he felt they might all benefit by the opinions and suggestions of the younger members. He asked the Association to record a very hearty vote of thanks to Mr. Martin for his work as Delegate at Bangalore. This was carried unanimously. He also proposed a vote of thonks to Mr. Gwynne for auditing the Association Books and to Mr. Wright for his good work at the Sri Mulam Popular Assembly.—Carried *nem. con.*

The Chairman then asked the Meeting to record a very hearty vote of thanks to the Honorary Secretary for his work and efforts in the Association's interests during the past year. Mr. Hughes had given a great deal of his time, and he was sure they all greatly appreciated his work. This was carried *nem. con.*

Mr. Hughes thanked the members for the vote of thanks and for the honor they had done him in re-electing him as Honorary Secretary, and promised that what he could do to help the Association he would do.

A vote of thanks to the Chair terminated the Proceedings.

(Signed) C. FRASER,
Chairman.

Letchmi Estate, 11th June, 1912.

(„) ERNEST A. HUGHES,
Honorary Secretary.

IN LIGHTER VEIN.

A Red Letter Day.

('This is a red-letter day,' etc.—Scientific Officer, Chikmagalur,
May 25th, 1912.)

Brightly dawns the long expected morning.
Beams 'old Sol' on Busanhulli's Club,
For at length in spite of scoffer's scorning,
We're to-day of universe the Hub.
Lo! Behold the 'ejman' of the Senate
With a caprine gurgle leaps from bed,
Dons his garments fresh from Wrenn and Bennett,
Deftly 'topi' fits on swollen head.
We, in darkness far too long have wandered
Without Science, devastating totes,
All our youthful energy we've squandered
And Brazil continually gloats.
Some of us, alas, 't must be admitted
With or without scientist would fail,
Quite a few deficiently are witted,
Some through 'anno domini' are stale.
Mark, a Northern chieftain gorging 'chota!'
See the grim manœuvres of his mouth,
As he soon, with partly swallowed bloater,
Button-holes a chieftain from the south.
He, his shaggy mask at once inclining,
Gravely listens and as gravely grunts,
And, at length, mysteriously signing,
Each his errant secretary hunts.
These enthusiasts at last are sighted
Waiting outside scientific door,
Each wtth self importance quite delighted,
Each with cigarette well stuck in jaw:
"A-st-d is within?" it is suggested,
"True, his pleasure now do we await"
"Is Fr-t-ni up and is he rested?"
Then the four at once gesticulate:
"See he comes, our scientist well trusted!"
Deep obeisance make the sapient four,
But our A-st-d is not to be busted,
Shuts he in their faces, soon, his door.
In the meanwhile, all who seek salvation
Do with one accord the scheme discuss,
Everywhere is seen much agitation,
Everywhere is hurry, scurry, fuss.
And the buzzing office-bearers babble,
Laws lay down with ignorance profound,
Each intoxicated with his gabble,
Each delighted with his voice's sound.
Now, the fateful hour of ten is ringing,
Now, the Senate House is thronged with Wit
And, without, the little birds are singing,
While within all breathlessly, we sit.
One great Councillor, with nerve abounding,
Self-appointed chairman, takes the floor,
On his hind legs, with a grunt astounding,

Starts proceedings that: "Haw Haw Haw Haw."
He, with rhetoric now celebrated,
Prays great A-st-d to address the throng.
Science, slowly rising, looks elated,
Bursts forthwith into manurial song.
Soon an ignoramus puts a query,
Whether 'Rough on Rats' is good for mice.
Science answers, looking somewhat weary,
"Ask Fr-t-ni, he will give advice."
Now, superfluous questions are showering
On our scientist's devoted head,
Lack of knowledge shown is overpowering,
Few, for shame! their 'Chronicle' have read!
A. regards his 'legume' with suspicion,
B. much fears his 'nodule' is diseased,
C. about his 'black rot' wants tuition,
D. with 'mulch' is very much displeased.
E. to *Z*. are mostly agitated,
Some are very needful of advice,
Others do require it to be stated
How to act to quickly raise 'our price.'
When, at length, manurial concert ended,
Then, our Mentor, rising to his feet,
Shows Fr-t-ni's form on chair extended,
Introduces, sighs, and takes his seat.
Rage! Brazil, and howl! poor Costa Rica!
Mexico and Guatemala too!
Now your attitude will soon be meeker,
Tremble! quake! now what won't Mysore do!
Epoch marking day! for young Fr-t-ni
Well is girt for scientific fight,
Youthful champion! he looks quite beany,
On chaotic totes Let there be Light!
Thus, auspicious installation closes
And the senators sit down to feed,
Bent o'er soup are legislators' noses,
As they prate of 'legume' and of weed.
But, with pride on many a tote next morning,
Surely will the husbandwoman hear!
How, in conclave, criticism scorning.
Boldly babbled 'Hubby' without fear.
Dies, at length, this day so epoch marking,
In the calendar we've all marked red,
Soon the Busanhulli dogs are barking,
And each senator doth seek his bed.

(Busanhulli Bard).

RUBBER IN THE BELGIAN CONGO.

Planting was commenced in 1893 of *Manihot Glaziovii*, in 1894 of *Funtumia* and in 1896 of *Hevea*. These first plantings were rather experimental than otherwise, the number of trees, being small. It was only about 1897 that regular plantations were started, and by private enterprise. By 1900 several companies had established relatively important plantations, one of them having over 24,000 *Manihot* trees, while another has 3,000 *Heveas* and 150 *Ficus Elastica* trees.

RUBBER

Diseases of Rubber Plants.

Mr. Herbert Wright delivered his fifth and last lecture at the Imperial College of Science on Monday afternoon May 13, 1912. He pointed out how in the past the best agricultural yields had frequently been obtained on small plots; when large acreages of the same species of plant where under cultivation any disease or pest, no matter where it was carried by wind, always found the same food supply available. This continuous uninterrupted food supply greatly assisted dangerous diseases and pests in their spread. To some extent their ravages could be checked by retention of forest belts, adopting only small acreages isolated by other products, or mixing of products on plantations. Mr. Wright pointed out, however, that many of the wild trees and cultivated products might themselves serve as a source of new diseases and pests which might adapt themselves to rubber trees. He, therefore, believed the only reliable course to be the appointment of plant sanitation officers for estates whose duty would be to inspect and treat all affected trees promptly, to see that proper implements and chemicals were always kept in stock, gangs of coolies were always at work cutting out diseased bark, pruning branches suffering from dieback, isolating trees attacked by *fomes*, and attending to the usual operations necessary to keep the diseases in check.

In his opinion there were four most important rubber diseases. The first was that which caused canker in the stem and known also to affect the fruits (Phytophthora); the second was the pink fungus (Corticium), which was doing such enormous damage in Java and elsewhere; the third was that causing dieback (Botryodiplodia) of the upper parts of the trees and the ends of branches; the fourth was *Fomes semitostus*, which, with or without white ants, was already responsible for the death of thousands of Hevea trees every year. It must not be forgotten that these really dangerous diseases occurred on the fruits, branches, trunks, and roots of *Hevea brasiliensis.*

He complained that so few people realized the gravity of the position, for whereas they would agree to provide one white man to supervise every 300 acres of Hevea for tapping and general cultivation, only one mycologist was provided for 220,000 acres of Hevea in Ceylon, and two for 400,000 acres in Malaya. It was impossible for one plant sanitation officer to deal with anything like such an acreage. He regarded the paucity of scientific officers on rubber estates as one of the gravest errors of our administration, and appealed to private companies and Government to tackle the problem now while diseases and pests were in their infancy. It was pleasant to be able to record that now we had at last one institution wherein men could be trained for such posts, as well as in any other university in Europe. He trusted that as Great Britain had led the plantation industry so far, it should not neglect one of its most valuable assets. The rubber plantation industry, if maintained in a healthy state, would bring to this country alone some twenty to thirty million sterling annually; if it were not protected against disease it may easily go the way of coffee and cinchona.

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Scientific Officer's Papers.

CIV.—FERTILISATION OF FLOWERS.

The fertilisation process in flowers is dependent upon the deposition of the pollen grain on the stigma of the flower. The pollen tubes on germination have no power of penetrating the tissues of the style except when placed upon the specially receptive stigma. This necessary transference of pollen grains from the anthers on to the stigmas is called *pollination*.

When the stigma receives pollen from the anthers of the same flowers the latter is said to be *self-pollinated*, or *self-fertilised*; frequently, however, the stigma in one flower receives pollen from a flower on another distinct plant, in which case the flower receiving the pollen is said to be *cross-fertilised*. Another variation is intermediate between these cases, namely when the pollen of a flower is transferred to the stigma of another flower growing on the same plant.

Now most plants have their sexual organs close together in the same flower so at first sight it might appear that self-fertilisation would be the rule among flowering plants, and undoubtedly many plants are self-fertilised. But careful and extensive observation of flowers has shown that a large number of plants are cross-fertilised and experiments have proved that the plants derived from seeds which have arisen from cross-fertilised flowers are in the most cases more robust in constitution and reproductive of more and better seeds than those arising as a result of self-fertilisation.

A great many devices are found among flowering plants to ensure a preponderance of cross-fertilisation over self-fertilisation. The chief of these are the following:—

(1.) The sexual organs may be produced in separate flowers, either on the same plant or on different individual plants, as in the case of the Papaw.

(2.) Although the male and female sexual organs may be in close proximity in the same flower they frequently do not ripen together. This is the case with the coffee flower where the stigma is ripe and receptive before the stamens in that flower ripen and set their pollen free.

(3.) The relative position of the anthers and stigma is often such that the transference of pollen from the former to the latter is a matter of difficulty.

(4.) In the case of many orchids the pollen has no fertilising effect upon the ovules produced in the same flower; such flowers cannot be self-fertilised at all.

Since pollen grains have no power of spontaneous movement they must be carried from one flower to another by some outside agency, and wind and insects are the most important of these agents. Almost all the grasses are wind pollinated. Their flowers are small and inconspicuous without scent or honey and the pollen grains are light and smooth while the stigmas are large and feathery and especially adapted to catch the floating pollen grains from the air.

Insect pollinated flowers usually have brightly coloured sepals or petals, are often highly scented, and are furnished with special glands, called *nectaries*, which secrete a sweet liquid commonly referred to as 'honey.' The pollen grains in such flowers usually have rough sticky surfaces which enable them to readily cling to the bodies of insects, while the stigmas are comparatively small and often exude a viscous substance to which the pollen grains easily adhere and in which they readily germinate.

The insects which visit flowers are chiefly beetles, flies, moths, butterflies, and bees. The colours of flowers, their odours, the nectar which they secrete serve to attract these insects and even enable the latter to distinguish one kind of plant from another. In their search for nectar such insects unconsciously bring about cross-pollination of the flowers.

In the case of open flowers a large number of different kinds of insects are attracted and many of them creep about and simply effect self-pollination. But in many cases the nectar is secreted and stored at the base of long tube-like corollas where it can only be got at by insects possessing long tongues. In these cases the anthers are so arranged that they must be touched by the body of the visiting insect and the pollen dusted upon it, often at some particular point, which point is brought into contact with the stigma of a flower subsequently visited and cross-fertilisation is brought about in this way.

An example of a flower arranged in this way is familiar to every one in the Snapdragon, but the numerous devices to ensure the visits of particular insects only, and through them cross-pollination, is a fascinating study and one about which many books have been written. The different colours, shapes and scents of plants are intimately connected with the visits of certain special insects and complicated devices for cross-pollination. Some flowers are so highly organised in this respect that they can only be fertilised by one particular kind of insect. The vanilla flower is a familiar example; this can only be fertilised by one particular kind of moth and when vanilla is grown in a country where that moth does not exist artificial fertilisation by hand must be resorted to in order to obtain a crop of beans.

Although many flowers are unable to produce seed, or produce but few, when insects are excluded, others which show special adaptation for cross-pollination by insects, and which are usually pollinated by these agents, have also the power of self-fertilisation and often exercise it in dull weather or at other times when insect visitors are scarce. Coffee is probably one of this class of plants. It is most advantageously cross-pollinated by bees and other insects but in their absence it can effect self-fertilisation. Such flowers are often so arranged that self-fertilisation shall take place in the event of cross-fertilisation failing as a kind of last resource.

RUDOLPH D. ANSTEAD,
Planting Expert.

DISTRICT PLANTERS' ASSOCIATIONS.

The South Mysore Planters' Association.

Proceedings of a Meeting held at Lingapur, on July, 4th, 1912.

PRESENT.—Mr. F. M. Hamilton (President), Hon'ble Mr. P. F. X. Saldanha, Messrs. C. J. Hayward, H. F. Anderson, W. F. Scholfield, S. Sladden, J. G. H. Crawford, Thiselton Anderson, W. L. Crawford, and M. J. Woodbridge (Honorary Secretary.)

The minutes of the last meeting were taken as read and confirmed.

Instructions to Delegates to the U. P. A.—The agenda of the U.P.A. was gone through and instructions to the delegates were given on various points.

Kalisyndikat's Offer.—This was accepted and a vote of thanks passed to Mr. Anstead for the trouble he had taken in the matter.

Registration of Maistries.—A scheme for registration of maistries was brought before the meeting by the Committee appointed at the last meeting for this purpose.

The majority of the meeting was, however, against any form of registration and after a long discussion the following resolution was carried :

Proposed by Mr. W. L. Crawford,
seconded by Mr. Thiselton Anderson:

"This Association consider that at present the time is not ripe for a general registration of maistries, but thinks a beginning might be made by each Association keeping a Black List upon which all defaulting maistries of that Association be annually entered, and that this list be open for the information of the members of this and other Local Associations joining the scheme."

The Honorary Secretary was asked to write and forward copies of this resolution to the other Mysore Associations and to Coorg.

Election of Honorary Secretary, Saklaspur Group.—Mr. W. F. Scholfield was duly elected.

Election of members of the Council of Mysore Planters' Associations.—Messrs. F. M. Hamilton and W. L. Crawford were elected, the Honorary Secretary (Ex-officio) being the third.

The minutes of the meeting of the Council of Mysore Planters' Associations held at Chickmaglur on May 24th were read and explanations given on several points by the South Mysore members.

Coffee-land Assessment.—Transfer of Coffee Land from temporary to permanent tenure.

Mr. W. L. Crawford gave a report on his interview with the Mysore Government Revenue Commissioner on this subject and said that he had been asked to get a ruling from the Deputy Commissioner of Hassan on the point in question. (*i.e.*) that planters now holding coffee land on 30 years' tenure should be allowed to put such land on permanent tenure and be granted title deeds for same without penalty. This can only be done at present by paying excess tax for the last 30 years.

It was decided that the Association should take the matter up when the required ruling of the Deputy Commissioner has been obtained.

Subscription to the International Rubber Exhibition held in London last year.

It was decided to place the amount of subscription refunded to the credit of the Association.

The meeting closed with a vote of thanks to Mr. Scholfield for the use of his bungalow.

(Signed) M. J. WOODBRIDGE,
Honorary Secretary.

Bababudin Planters' Association.

Proceedings of a Quarterly General Meeting of the Bababudin Planters' Association held at Chickmaglur on Wednesday, July 3rd, 1912.

PRESENT.—Messrs. Denne (President), Hugonin, Watson and Kirwan (Honorary Secretary), Honorary Member Mr A. Subrahmanya Iyer.

The minutes of the previous meeting were taken as read.

M. & S. M. Ry. Unloading Charges.—The Honorary Secretary was instructed to write Mr. G. R. Oliver, and thank him for having secured the promise of the Traffic Manager to discontinue these charges at Birur.

Santaveri Sunday Dispensary.—Correspondence read. The Honorary Secretary was instructed to write to the P. M. O. and request the services of an Assistant from Chickmaglur Hospital to visit Santaveri.

C. of M. P. A's.—Messrs. Denne, Hugonin and Kirwan were elected members.

District Board.—Read letter from the President of the District Board. *re* the abandonment of the Bababudin Hill Road from Miles 22—29. Read also Messrs. Denne, Johnson, Oliver and Courpalais letters on the subject.

Resolved: "That the Secretary be asked to write the President of the District Board, and say that this Association agreed that there was no necessity to repair the damaged portions of the road in miles 22—29, and that they might be abandoned." That this Association was of opinion that a road constructed from Kulhuttypur towards Hebby through the top portion of the Government Reserve Jungle would be of great service to the Forest Department as opening up the Lukavalli Jungles, and would be a great convenience to the estates on that part of the Hills, amounting to several thousand acres, which are at present without a Government road. The Association asks the District Board to give this matter their serious consideration.

Delegates to U. P. A. Meeting.—Messrs. G. R. Oliver and Kirwan were elected as Delegates. The U. P. A. agenda was discussed.

Manurial Experiments.—The Association were in favour of accepting the Kalisyndikat's offer, and the Delegates to the U. P. A. were instructed accordingly.

Labour Rates.—Mr. Urquhart's letter to the Honorary Secretary was read. The Honorary Secretary was instructed to write and thank Mr. Urquhart for this letter.

(Signed) N. G. B. KIRWAN,
Honorary Secretary.

Wynaad Planters' Association.

Proceedings of a General Meeting held at Meppadi Club on July 3rd, 1912.

PRESENT.—Messrs. Dargin, Egan, Gillatt, Powell, Waddington, and C. E. Abbott, (Honorary Secretary.) *Visitor.*—Mr. Briggs. Mr. Waddington in the Chair.

1776. *The proceedings of last meeting* were confirmed subject to para. 1777.

1777. *Westward Ho Bungalow.*—Read correspondence relative to para. 1770 in last proceedings. The action of the Honorary Secretary in accepting Rs.2,500 for the bungalow is approved.

1778. *Non-Execution of Warrants.*— Reference para. 1769 in last proceedings. Read correspondence which is closed by a letter from the Deputy Inspector General of Police stating that under orders from the Inspector General of Police the proposal is to be held in abeyance pending further instructions.

1779. *Denudation of Tambracherry Ghaut.*—Read letter from Honorary Secretary to the Collector of Malabar and his reply, stating that the matter is being inquired into; and mentioning that the question is allied to that of the protection of the Head Waters of important rivers, and desiring the co-operation of the members of the Association in protecting the tree growth along the banks of all streams which traverse estates. Recorded. The Association will be glad to consider this matter in correspondence with the District Forest Officer. The particular danger that was referred to in para. 1771 last proceedings was that of heavy landslips on the Ghaut roads.

1780. *District Board Membership.*—Mr. J. C. Carson Parker has been appointed as representative of this Association.

1781. *The late Mr. Atzenwiler.*— Mr. Waddington informed the Meeting that Rs.295 had been subscribed towards a memorial stone over the graves of Mr. Atzenwiler and Mr. Punnett.

1782. *Coolies Contract under Act I of* 1903.—Read letter from Honorary Secretary, Nilgiri P. A., enclosing copy of judgment of the Coonoor Magistrate in a recent case. The Honorary Secretary was asked to make further inquiries.

1783. *Sale of bad grain and diseased meat.*—Read letter from Mr. Gillatt to Honorary Secretary, latter's letter to Mr. Cammiade, Deputy Collector, and his reply. The Meeting thanked Mr. Cammiade for his letter and resolved to act on his suggestion.

1784. *Employment of Military Pensioners.*—Read letter from Colonel Monck-Mason. The opinion of the Meeting was that the class of men likely to be employed in Wynaad would be pensioners from Native Regiments. Some members present said they were prepared to employ such men on special work on estates (factory watchmen, cart-drivers, gardeners, or assistant engine drivers.) The Honorary Secretary was instructed to write to Colonel Monck-Mason to the above effect.

1785. *U. P. A. S. I. Meeting.*—The Meeting approved of the date for opening the Meeting (August 12th) and gave instructions to the Delegate on various matters.

1786. *Cattle Nuisance.*—Proposed by Mr. Stewart, seconded by Mr. Gillatt, and carried unanimously: "That our Bangalore Delegate be asked to propose that Government be invited to take measures to abate the nuisance of cattle straying on the public roads uncontrolled to the danger of passengers."

1787. *Stray Dogs.*—Read G. O. 7614 dated May 17th, 1912 communicated by the President, Wynaad Taluq Board. Resolved: "That the Wynaad Planters' Association's representative on the Taluq Board be asked to support the proposal."

1788. *Date of next Meeting.*—This will be held on September 4th, 1912.

A vote of thanks to the Chair terminated the Proceedings.

(Signed) H. WADDINGTON,
Chairman.
(„) C. E. ABBOTT,
Honorary Secretary.

TEA IN THE NETHERLANDS.

A Consular report on the Trade of the Netherlands in 1911 states:—

142,000 chests, averaging 40 kilos. of Java tea were imported into the Netherlands, and the stock of all kinds on December, 31, 1911, amounted to 2,726,500 kilos.

China descriptions fetched about 11*d.* per ½ a kilo., duty paid (about 8*d.*), and Java kinds from 8*d.* to 9½*d.* in bond.

——o——

TEA OIL—WHERE DERIVED AND ITS USES.

An article for which, perhaps, a similar part is destined to that of the sesame seed—which, hardly known ten years ago, to-day occupies second place in the export trade of Hankow, China, and is fifth in the foreign commerce of that country—is tea oil. This oil is extracted from the oil-yielding tea shrub, or tea oil tree, a variety of the real tea plant the leaves of which yield the national beverage of the Chinese.

The seed, as large as a hazel nut, is located in round capsules, usually threefold. It is yellow inside, and covered with a brown shell. The clean, hulled kernels furnish an oil yield of 30 per cent., whereas, by expressing the raw nut about 20 per cent. can be obtained. Tea seed oil is pale yellow and has a more or less astringent taste. It belongs to the non-drying oils and in character resembles olive oil. The saponin substances it contains, which are not beneficial to human health, are destroyed by boiling. The oil is consequently used by the Chinese as a food oil. Its employment in domestic food supply industries is advocated. Soap manufacturers find in it a very good raw material, as it produces an excellent hard white soap. The presence of saponin is not detrimental, rather increases its lathering and washing power.

As a lubricating oil, this highly non-acid oil that is hardly subject to rancidity, is useful. The residue obtained from the pressing of hulled tea seed appears to be practically valueless. The shipment of tea oil from Hunan into the neighbouring provinces is quite considerable. The quantity possibly available for foreign export is as yet uncalculated. The principal producing locality is southern and north-western Hunan.—*Spice Mill.*

COFFEE.

The Market.

BY HENRY NORDLINGER & CO., NEW YORK.

[*Written especially for the Spice Mill.*]

New York, May 6.—The continuation of heavy receipts at Santos caused some uneasiness among the smaller bulls and, likewise, encouraged renewed activity on the part of bears.

The current Santos crop, which had, heretofore, been generally estimated at nine and one-half million bags, now looks as if it will reach 10 million bags, while the estimates of the growing Santos crop of seven to eight million bags have not been changed.

The Santos market continues to rule firm, considerably above the prices ruling in consuming markets, which indicates that holders there are confident of realizing higher prices later on, despite the close approach of the new crop movement.

The withdrawals for consumption in Europe and the United States exceed those of a year ago by about 230,000 bags, showing no curtailment in the consumption as compared with last year. This feature is of the utmost importance, because it shows that prevailing prices do not interfere with the consumption of the article.

The mild coffee crops, as judged by the arrivals of these kinds of coffee in Europe and the United States, show some increase over last year's production. Nevertheless, prices hold firm, especially at points of production, on account of the comparatively small quantity left there.

The marketing of these crops has, this year, taken place at steadily advancing prices, and has not been influenced in the least by the fluctuating experienced in the speculative market.

Wessels, Kulenkampff & Co., Coffee Importers, New York, in their circular of May 1, say of coffee:—

The fact that holders of coffee in Brazil are showing no anxiety to force sales in the face of liberal receipts proves better than anything else that the leading authorities there are still believers in a very small coming crop. The reports which we received lately confirm earlier estimates of less than 10 million bags during 1912 to 1913 for Rio and Santos. We do not look for important changes in the situation during the current month, but remain believers in higher values later on.

Aborn and Cushman, Coffee Brokers, New York, in their review dated May 3, say:—

The decline in option values and in the demand for coffee, has had the effect of making prices on spots lower, with market still easy. Sellers are now anxious to meet buyers, putting their best foot forward, as to quality and prices. The claim is advanced that the increased Santos receipts were due to a need of coffee, to deliver on term sales in Santos. The value of this explanation will be more apparent to the trade when the predicted perpendicular decline in receipts is really a fact. . . . A curious phase of the whole situation is the seemingly complete absence of anything that resembles confidence, either in the minds or operations of the whole trad. A few, close to the powers that be, are whistling loudly, but the general trade apparently never lose sight of a distant graveyard. . . .

Milds:—Maracaibos are still prime value. Bogotas show a trifle easier basis.

At Havre.

A Consular report states :—

The movement at the Havre docks in 1911 was as follows :—

Brand.	Imports. 1910. Sacks.	Imports. 1911. Sacks.	Cleared. 1910. Sacks.	Cleared. 1911. Sacks.	Stocks. 1910. Sacks.	Stocks. 1911. Sacks.
Brazil ...	841,946	568,720	1,071,773	800,024	2,125,911	1,894,607
Hayti ...	330,319	242,284	236,037	265,384	150.421	127,321
West Indies and Central America ...	329,147	312,046	289,325	373,321	217,451	156,176
India, Java & Malabar ...	67,493	75,798	57,266	77,080	65,209	63,927
Africa & other countries ...	26,683	28,724	29,532	30,339	19,786	18,171
Total...	1,595,588	1,227,572	1,683,933	1,546,148	2,578,778	2,260,202
Unloading...	...	...	...	...	72,185	86,800
Grand total ...	...	...	...	...	2,650,963	2,347,002

The imports of coffee *viâ* Havre in 1911 show a decrease of about 370,000 sacks as compared with 1910. This applies almost entirely to the Brazilian coffee (decrease of 273,000 sacks) and the Hatian coffee (decrease of 88,000 sacks). The crops in Brazil and Hayti having been much smaller in 1910-11, the exports from these countries to this port, as well as to other ports, could not but decrease this last year.

The production of coffee shows the following amounts since 1903 :—

Season.		Brazilian Production. Sacks.	Production of other Countries. Sacks.	Total World's Production. Sacks.
1903—04	...	11,101,000	4,891,000	15,992,000
1904—05	...	10,523,000	3,923,000	14,446,000
1905—06	...	10.844,000	3,948,000	14,792,000
1906—07	...	20,190,000	3,596,000	23,786,000
1907—08	...	11,001,000	3,861,000	14,862,000
1908—09	...	12,912,000	4,003,000	16,915,000
1909—10	...	15,324,000	3,801,000	19,125,000
1910—11	...	10,848,000	3,676,000	14,524,000

The Brazilian production is divided amongst the different exporting ports as follows :—

Season.		Receipts at Santos. Sacks.	Receipts at Rio. Sacks.	Receipts at Bahia and Victoria. Sacks.	Total. Sacks.
1903—04	...	6,395,000	4,020,000	685,000	11,101,000
1904—05	...	7,426,000	2,542,000	555,000	10,523,000
1905—06	...	6,983,000	3,244,000	617,000	10,844,000
1906—07	...	15,392,000	4,234,000	564,000	20,190,000
1907—08	...	7,203,000	3,108,000	690,000	11,001,000
1908 -09	...	9,533,000	2,883,000	496,000	12,912,000
1909—10	...	11,495,000	3,449,000	380,000	15,324,000
1910—11	...	8,110,000	2,438,000	300,000	10,848,000

The quotations which were at 70 fr. for good average Santos at the commencement of the year and at 74 fr. about January 15, declined sharply to 61 fr. in February, in consequence of heavy realisations by the bulls. Starting at 45 fr. on July 1, 1910, they rose considerably, in fact 70 per cent. within the space of six months.

The Committee of Valuation announced, as early as January, the sale of 1,200,000 sacks of coffee of the Government of the State of Sao Paulo for the month of April, of which 600,000 sacks in Europe and 600,000 sacks in the United States. These 1,200,000 sacks were sold on two occasions: 600,000 sacks on April 1 and 600,000 sacks on April 22. Prices remained them for some time at about 65 fr.

The information regarding the next Brazilian crop (1911-12) was rather contradictory. It was to be rather large according to some and rather small according to others. Unfavourable weather at the blossoming time and rainfall at the time of harvest considerably diminished the yield. Under all these unfavourable influences for production, prices did not fail to rise, and the upward tendency continued until October, when the price of 90 fr. was reached.

Then the big bulls began to realise, so that the good average coffee at the end of the year only cost 80 fr. The fall was further accentuated in January, when 74 fr. was dealt at and quoted, but the information concerning the next Brazilian crop became still more unfavourable, and prices have risen considerably. To-day (March 6) we are at 84 fr. for current and 81 fr. 50c. for September.

700,000 sacks of coffee of the valuation have been sold in February, of which 115,000 sacks came to Havre. The valuation stock to-day is only 4,408,000 sacks, of which 1,410,000 sacks are stored in Havre.

The out-goings from our port show again a decrease from the previous year. The diminution is actually of 270,000 sacks in the Brazil coffees as against an excess of 130,000 sacks in the other coffees. The deficit in the out-goings of the Brazil coffee is due in part to the amounts for home consumption and in part to re-exportation.

The following have been the amounts for consumption in France since 1905:—

		Total Quintals.	Of which Brazilian Quintals.
1905	...	909,855	449,266
1906	...	978,431	498,883
1907	...	1,015,697	535,130
1908	...	1,027,619	563,875
1909	...	1,079,420	639,172
1910	...	1,118.276	662,958
1911	...	1,110,510	571,707

In the Netherlands.

A Consular report on the Trade of the Netherlands in the year 1911 states:—

The arrivals in the Netherlands amounted to 1,871,085 bags against 1,445,200 bags in 1910 and deliveries to 1,704,614 bags, leaving a stock of 614,583 bags on December 31, 1911. Prices for good ordinary Java ranged from £3, 15*s*. 4*d*. to £4 6*s*. 4*d*. per cwt., which was the closing rate, and Santos fluctuated from £3 1*s*. 10*d*, to £3 16*s*. 2*d*. per cwt., closing at £3 11*s*. 1*d*. per cwt.

RUBBER.

Brazilian Legislation going into Effect.

"OBSERVER" writes in the *India-Rubber World*:—

It is satisfactory to note that the Government of Brazil means business. The provisions of the new law (a full extract of which appears in this issue) are not being allowed to lie dormant.

Two-thirds of the surveys connected with the proposed new railways will be finished by June 30, and the completion of the surveys will follow shortly afterwards. It is understood that the Government is prepared to spend the equivalent of about 92,000,000 on the new lines, intended for the development of rubber cultivation.

A company is said to have been organised at Bahia (with the co-operation of English capital) for the purpose of establishing a rubber goods factory at that point. under the encouragement afforded by the new measure.

With a view to improving the conditions of rubber cultivation, the Brazilian Government is said to be importing a large number of drills of American manufacture. Experts in their use accompany the drills which are intended for the boring of artesian wells. The Government is taking steps to distribute these drills among the various plantations standing in need of them.

New Brazilian Legislation.

An examination of the test of the new Brazilian law as approved on January 5 by the President, shows it to be a carefully formulated measure, covering rubber in all stages of importance from the soil to the outgoing steamer. These provisions made by considered under the heads of those directly referring to rubber and those bearing upon conditions more or less accessory to its cultivation by their influence upon the cost of production.

A—CULTIVATION.

That the high cost of producing rubber in Brazil is due to the excessive cost of living and transportation, has been pointed out by various leading authorities, and it is to these points, as well as to the direct promotion of rubber cultivation that the new legilation is directed. One of the principal objects in view being economy in cultivation, the exemptions provided by the first article of the bill form an appropriate introduction to its subsequent provisions. This clause provides for the free admission of all utensils and materials intended for the cultivation of *Hevea*, *Caucho*, *Manicoba*, and *Mangabeira*, as well as for the collection of customs and preparation of rubber extracted from those trees. Rapidity of customs procedure is enjoined by the bill.

Another feature of the encouragement of rubber cultivation, under the new legislation, is the establishment, by Article 2, of prizes for successful planters, in two broad divisions—newly cultivated and replanted lands.

In the former class they are graduated as follows. per group of twelve hectares (30 acres):—

	Milreis.	
Hevea	... 2:500	= $833 gold.
Caucho or Manicoba	... 1:500	= $500 gold.
Mangabeira ...	... 900	= $300 gold.

In the latter class they are graduated as follows, per group of twenty-five hectares (62½ acres):—

	Milreis.	
Hevea	... 2:000	= $667 gold.
Caucho or Manicoba	... 1:000	= $333 gold.
Mangabeira ...	... 720	= $240 gold.

These prizes may be claimed one year before the first crop, upon verification of the ground having been fully improved and the trees properly treated. A yearly increase of 5 per cent. since period of planting is added to in the value of the prizes where the planters can prove the parallel cultivation throughout their property of plants of industrial or elimentary utility.

Recognizing the importance of the training and instruction of planters, provision is made upon that subject in Article 3.

The Government is to establish at a point selected for the purpose, an experimental station, or camp of demonstration, for the cultivation of *Hevea* in the Territory of Acre, and in each of the States of Matto Grosso, Amazonas, Pará Maranhao, Piauhy and Bahia; as well as for the cultivation of *Manicoba*, in conjunction with that of *Mangabeira*, in each of the States of Piauhy, Ceará, Rio Grande de Norte or Pernambuco, Bahia, Minas Geraes, S. Paulo, Goyaz, Parana and Matto Grosso.

These stations will furnish gratuitously to all interested persons asking for them, selected seeds, with instruction as the most practical and economical method of cultivation.

B—EXPORT DUTIES.

Relegated from its original position in the bill under old Article 4, the question of the modification of export duties is treated in a new article—12 – in the following terms:—" The Executive Authority is empowered to enter into agreement with the States of Pará, Amazonas and Matto Grosso, with the object of attaining a yearly reduction of 10 per cent. up to the maximum limit of 50 per cent. of the present amount of export duties collected by the States upon the *Hevea* rubber produced in its territories, and exempted from all export duty for the term of twenty-five years, counting from the date of this law, of rubber of the same quality and origin collected from oultivated plantations."

" As soon as this agreement has been made, the Executive authority will issue a decree, applying the reduction made by the said States to the export duty collected on rubber from the Federal Territory of Acre, and conceding like exemption as to cultivated rubber."

C—RUBBER REFINING AND MANUFACTURE.

The above objects are provided for in new Article 4 under separate heads. A premium up to milries 400:000 ($130,000) will be awarded to the first *Hevea* refining plant which shall, reduce the different qualities to a uniform and superior export type, and which shall be established in each of the cities of Balem (Pará) and Manaos. Asremium equalling $33.000 gold will be awarded the first plant for refining both *Manicoba* and *Mangabeira* rubber, to be established in each of the States of Piauhy, Ceará Rio Grande de Norte, Pernambucc, Bahia, Minas Geraes and S. Paulo.

Encouragement is afforded for rubber manufacturing by a provisions for a premium up to milreis 500:000 ($160,000 gold) to the first plant for manufactures of rubber to be established in Manaos, Belem (Pará), Recife, Bahia and Rio de Janeiro. In order to be entitled to the favour specified in this article, it is necessary for the factory to have paid up capital equalling four times the value of the premium.

D—TRANSPORT.

The above are the provisions directly bearing on the rubber industry. There are accessory conditions which are dealt with in other article providing for the new railways and improved river navigation necessary to facilitate and cheapen transport. Under Article 6 it is provided that :—

" In order to facilitate transports and to diminish cost of same in the Amazon Valley, the Government will get executed within the shortest time possible the following improvements and supplementary measures :—

1. Construction of narrow gauge railways along the rivers Xingu, Tapajos and others, in Pará and Matto Grosso, and the rivers Negro, Branco and others in Amazonas, and penetrating into the valleys washed by them ; by public competition in accordance with the law of December 13, 1903, or at a rate per kilometer, according to the judgment of the Government and the difficulties presented by the region.

In case of the States of Pará and Amazonas having contracted for the construction of any of these lines, the Government, for the more rapid completion of the work, will grant them an increase of 15 cantos per kilometer ($8,000 mile).

2. Construction of a railway starting from a convenient point on the Medeira and Mamore line, near the mouth of the river Abrina, passing through Villa Rio Branco, and through a point between Senna Madureira and Caty ; ending at Villa Thamaturgo, with a branch to the Peruvian frontier, through the valley of the river Purus.

The construction of this line will be in accordance with the regulations of the law No. 1,126 of December 13, 1903.

As soon as the first section of the trunk line is completed as far as Villa Rio Braneo the Government will establish a Custom House at Porto Velho on the river Madeira, and will declare that port open to the commerce of friendly nations.

3. Construction of a railway starting from the port of Belem (Pará), and connected with the railway system at Pirapoa, State of Minas Geraes, and at Coroata, in the State of Maranhao ; with the branches necessary to connect the initial or terminal points of navigation of the Rivers Araguaya, Tocantins, Parnahyba and S. Francisco.

This railway will be constructed under the regulations of the law of December 13, 1902, and the construction awarded by public competition.

4. The necessary works will be executed for rendering navigable at all seasons of the year for vessels of certain draught :—the river Negro, between Santa Isabel and Cucuhy ; the river Branco, between the mouth and the fort of S. Joachim ; the River Purus, from Hyutanahan to Senna Madureira, and the river Acre, from the mouth to Riosinho das Pedras.

The Government can contract for the execution of the above works by means of public competition or independently of competition, with one or more suitable concerns, applying the regulations of the decree No. 6,368 of February 14, 1907.

Such are the plans for improved transportation by rail and river ; materials and machinery for the improvement of navigation being free from import duties under Article 7.

Similar exemption will be conceded under Article 8, to concerns which, in public competition, will bind themselves to establish depots of coal at a point in the Amazon valley previously indicated, for the purpose of supplying coal to steamers and launches at prices approved by the Government.

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(INCORPORATED.)

The Secretaryship, &c.

It is understood that Mr. Fletcher Norton will assume charge of the Secretaryship of the U. P. A. S I., and will also take charge of this paper, on the 3rd August, 1912. The present Office and Laboratory premises are to be taken over from Mr. Ormerod.

The Annual Meeting.

A complete list of delegates has yet to be received. Hony. Secretaries of District Planters' Associations are requested to be good enough to give prompt attention to this matter.

ROADS AND COMMUNICATIONS.

The Shevaroy Planters' Association has given notice of its intention to move the following resolution at the Annual Meeting:—

"That Government be asked through the U. P. A. S. I. if they will hand over the Ahtoor Ghât Road to the I. P. R. and Tea Estates Co., Ltd:—whether they will grant an allowanoe towards the repairs—if so how much, and also whether the Company would be allowed to fix their own Toll Gate."

Planting Member of Council.

The general election for the Madras Legeslative Council is likely to be held about November next, and planters will be called upon in due course to elect a representative.

The S. I. P. B. F.

Mr. Ormerod relinquished charge of this Fund on the 17th instant, and made over to the Chairman certain remittances that were in hand. This has delayed for a short time the issue of formal acknowledgments in these cases.

The U. P. A. S. I. Exhibition.

Reminders have been sent out concerning the Exhibition that is to be held in connection with the Annual Meeting that will open on the 12th Proximo. It is intended that the Exhibition should be arranged at the Office premises, as before. Mr. G. N. Frattini will probably be in charge, assisted by a small Committee. Exhibits should be addressed to the Secretary, U. P. A. S. I., and if despatched by rail should be booked to Bangalore Cantonment Station.

A coffee pulping machine, in work, is likely to be one of the chief features of this year's show.

Destruction of Bees.

G. O. No. 2062 Mis., dated 11th instant, has been communicated to the Association by the Secretary to the Government of Madras, Revenue Department. It reads as follows :—

" Recorded,

" 2. The further report promised by the Director of Agriculture is awaited."

[INCLOSURES.]

Copy of Proceedings from the Board of Revenue, Rev. Sett. No. 1088 *Mis. dated* 28*th March*, 1912.

Read the following papers:—

I

Endorsement from Government Revenue Department.

Dated 18th December, 1911.

No. 3,000 3/11-1.

II

Reforence from the Board of Revenue, Revenue Settlement.

Dated 3rd Jaunary, 1912.

No. 13—

Referred to the Director of Agriculture for remarks.

III

Letter from G. A. D. Stuart, Esq., I. C. S., Director of Agriculture.

Dated 11th March, 1912,

District No. 517.

In reply to Board's Reference No. 13, dated 3rd Jaunary, 1912 I have the honour to submit the following remarks :—

2. The Government Botanist and Mr. Fletcher, the future Madras Entomologist, whom I have consulted inform me that it has by no means been proved that bees are essential for the pollination of coffee. It would be possible to test this by a few simple experiments and I am asking Mr. Fletcher to arrange to carry these out.

3. If it is proved that wild bees play an important part in the pollination of coffee, then it would certainly be advisable to prevent the destruction of bees, if possible. I was doubtful myself whether the destruction of bees by the native honey and wax collectors causes much serious decrease in the number of bees. The Planting Expert, however, informs me that many planters have assured him that there has been a serious diminution in the number of bees in planting districts in recent years. I think that it would, probably, be extremely difficult to induce the jungle tribes who at present collect honey and wax to change their methods. It would be impossible to control them. Nothing but the absolute prohibition of honey and wax collection would have much effect. Even this would be very difficult to enforce and the planters state especially that they do not want it. However, if Mr. Fletcher's experiments show that bees are essential for the pollination of coffee, I will ask him to enquire and report on the possibility of reforming the native method of honey and wax collection.

4. The true solution of the problem appears to be that the planters should keep their own bees and should prevent any destruction of wild bees on their estates. Mr. Fletcher has experience of bee-keeping at Pusa and will be asked to investigate the problem of the keeping of hive bees in the planting districts of Madras.

5. The enclosures in original are returned.

Resolution.—The letter from the Director of Agriculture read above is submitted to Government with reference to their endorsement No. 3,000 E/11-1 Rev. dated 18th December, 1911.

2. The report promised by the Director of Agriculture in paragraph 3 of his letter will be submitted to Government on receipt.

Copy of Proceedings from the Board of Rev. Rev. Sett. No. 2217 Mis. dated 27th June, 1912.

Read the following paper :—

Letter from G. A. D. Stuart, Esquire, I.C.S., Director of Agriculture, Madras.

Dated 13th June, 1912.

No. Dis. 1272.

Referring to your reminder dated 8th instant on B. P. No. 1088 Mis., dated 28th March, 1912 and my letter Dis. No. 517, dated 11th March, 1912, regarding the possibility of reforming the native method of honey and wax collection, I have the honour to report that, as the new Entomologist joined his appointment in this Presidency only on 24th April last; by which time the flowering season of coffee was over, the report promised in my letter dated 11th March, 1912 can only be submitted in a year's time after the Entomologist's investigation into the matter in the next season.

Resolution.—Recorded.

Indian Railway Finance.

Writing on the 5th instant the Secretary, Karachi Chamber of Commerce, remarked :—

" I am directed to enclose herewith for the information of your Chamber a copy of a representation made by this Chamber on the 1st instant to the Government of India on the subject of providing adequate financial recources for the further development and equipment of the Indian Railways.

" My Committee hope that if your Association finds itself in agreement with the representation now made, that your Committee will be able to see their way to give this representation their most valued support,"

[INCLOSURE.]

Five years ago an Indian Railway Finance Oommittee was appointed by the Secretary of State for India to enquire and report on, among other matters, . . . " whether the amounts allotted in recent years for railway construction and equipment in India were sufficient for the needs of the country and for the development of its trade; and if not, what additional amounts might properly and advantageously be raised for this purpose." . . .

2. The Committee reported that the equipment of Indian Railways had *not* been equal to the requirements of trade, and they suggested that

the allotments for railway construction and equipment should be increased beyond those of the preceding year. Their specific recommendation was . . . "that the programme of annual expenditure on railway construction and development in India be for the present fixed at £13.500,000 equal to £100,000,000 in the next eight years." . . .

3. My Committee notice that notwithstanding the above recommendation (which was heartily welcomed by the commercial community in India), the Secretary of State has never yet provided in full the annual sum recommended by the Indian Railway Finance Committee. The reason for this not very clear to my Committee, but they assume an explanation is perhaps to be found in the inability of the Secretary of State or the Government of India to borrow from the public all the capital sums that the Railway Board required, on such terms as Government wanted, *i.e.*, on terms that Government considered satisfactory, loooking to the urgency and importance of the Railway Board's demands as compared to the requirements of other Departments and of the position of Government's loans generally.

4. Last year the sum provided was £8,500,000; whilst for the current year (1912-13) the total allotment to the Indian Railways is only £9,000,000 of which it is understood practically the whole is to be devoted to existing lines, and lines the construction of which has already begun; so that practically nothing remains for the construction of altogether new railways.

5. In the meantime not only have the population, industries, and general trade of the country grown more rapidly than the ability of the existing railways to deal with the traffic, thus producing delays, congestions and hindrances to transport highly inimical to the interests of cultivators, merchants, exporters and all trade interests concerned; and further developments in the shape of new railway undertakings are now practically left entirely to the emergy, foresight and enterprise of private interests.

6. My Committeee view this situation with feelings of the gravest concern. Unless something be done immediately to recover the lost ground consequent upon Government's failure or inability to give practical effect in full to the recommendation of the Indian Railway Finance Committee of 1907, the complexities of the present situation must of necessity multiply, and progress of the country be materially checked.

7. The crux of the whole difficulty appears to my Committee to be a financial one. More capital is urgently needed, and the problem is—whence can this further supply of capital be obtained? In this connection my Committee venture to submit the following remarks to which they beg that Government will give consideration.

8. There seems to be only one source upon which Government can regularly depend for the supply of capital necessary for the better equipment and further development of India's railways, and that is loans from the public (in England or India.) Surplus revenue might, my Committee think, be applied wholly or in part—according to the emergency of the case —to the development of railways; but this source of supply is not to be relied upon with certainty, and can only be utilised from time to time when, and to such degree, as the circumstances of the moment permit. The further encouragement of private enterprise by the offer of five per cent. *Guarantee* in place of the present five per cent. *Rebate* terms would stimulate private activities to the construction of further branch or feeder lines; but here again the remedy could not be reiied upon with certainty nor would

it, even if successful, do more than help to a small degree towards the improvement of the general railway position in India, which is the subject of this Chamber's present representation.

9. It appears to my Committee, therefore, that Government are forced to rely upon one chief source of supply—loans from the public. In this connection my Committee desire to lay special emphasis upon the present world conditions. At the moment—and probably for some years to come—commerce and industries are face to face with a general upward movement in the level of prices. This general upward movement of prices is giving a marked stimulus to all production and trade and bringing about an increase in the earnings of capital that has the result of depreciating the value of all fixed interests bearing securities. In such circumstances there is little or no probability of Government being able to borrow largely at 3½ per cent. Indeed, my Committee fear that this rate of 3½ per cent. will probably have to be regarded, for some time to come, as a thing of the past. The result of the recent India loan of £3,000,000 emphasises this point. In these circumstances my Committee consider that it will be in the best interests of India that these facts should be clearly recognised and that Government should face the situation and continue raising money freely at higher rates than 3½ per cent. either by increasing the rate of interest or by offering India loans at a discount that will bring about the same result—a higher return to the investing public. My Committee most strongly deprecate any policy of delay on the part of Government until capital can be borrowed more cheaply. My Committee see no likelihood of cheaper capital in the immediate future, especially as my Committee believe that every British Colonial Government and many reliable Foreign Governments are prepared to pay better rates for capital than have hitherto been acceptable to the Government of India.

10. In the meantime money is urgently needed to bring India's chief railways up to a standard of efficiency adequate to the present demands of India's rapidly expanding trade. As a temporary measure, my Committee would urge the immediate utilisation of some of the Government of India's balances at present lying in London. My Committee notice that apart from the Gold Standard Reserve balance of nearly £18,000,000 (invested in London in British and Colonial securities), the Secretary of State holds on behalf of the Government of India over £17,000,000 in cash which in the absence of more profitable employment has been lent out in London to certain London Joint Stock Banks and others at rates approximating 2½ per cent. per annum. My Committee beg to enquire if £3/5.000,000 of this money cannot be at once converted by book entry into an India Sterling loan for the immediate service of the Government of India in the interests of the Indian State Railways.

11. To summarise, my Committee are most strongly of opinion that the Indian Railway Finance Committee's recommendation of an annual grant of £12,500,000 should be acted up to in full; that if the Government of India are unable to obtain this sum from surplus revenue and loans at 3½ per cent. then Government should at once face the situation and borrow at the market rate of the day, but on no account delay the railway construction in the hope of obtaining cheaper money at some future date; and lastly as a temporary measure, and in order to make up for the lost time, Government should utilise a substantial portion of their present £17,000,000 cash balance in London by converting £3/5,000,000 of it into an India Sterling Loan for the improvement and extension of Indian Railways.

Scientific Officer's Papers.

CV.—HYBRIDISATION OF PLANTS.

Since pollen is either insect or wind borne it must often happen that the stigma of one flower receives the pollen from a totally different kind of flower, but a fertile sexual union does not take place indiscriminately among plants. A certain relationship, or sexual affinity, must exist between the parent plants before their reproductive cells will unite. It is impossible to cross a Rose with pollen from a cabbage for instance, in order to obtain a fertile cross the pollen must come from the anthers of a Rose or some flower closely allied to a Rose. When the relationship between the male and female reproductive cells is too close, and also when it is too remote, fertility is reduced. For the production of the most vigorous and the most prolific progeny there must be a certain degree of difference between the reproductive cells which unite. The most fertile sexual union takes place between the reproductive cells of flowers which are borne on different, individual plants of the same species. The seeds resulting from such a union produce plants which grow luxuriously and bear heavy crops.

Varieties of the same kind of plant also cross readily and the resulting progeny are known as *Hybrids*. Such variety hybrids usually possess the following characters:—

(1.) They are often more robust and luxuriant than their parents, the root system being more extensive and the leaves and branches larger.

(2.) They usually grow more rapidly, flower earlier and produce a larger number of flowers than the parents.

(3.) If the flowers of the parents are dissimilar in colour the flowers of the hybrid are mottled with a mixture of these colours.

This character is largely made use of by horticulturalists in producing flowers with varigated or new colours.

(4.) The power of seed production is stronger than that of the parents,

These characters are amply illustrated in the hybrids of Cotton, Wheat Tea, and Coffee commonly cultivated.

In the first generation raised from seeds obtained by cross pollinating different varieties or species all the individual plants are in most instances similar to each other and resemble both parents, their characters in regard to the form and size of root, stem, leaf, and flower, are approximately intermediate between the two. The individuals of the second generation, however, that is the off-spring which arise from self pollination or cross pollination of the flowers of hybrids vary very much in form and in other ways; they do not resemble each other nearly so much as those of the first generation. Some of them almost exactly resemble the female, others the male parent, while many show the characters of both parents combined in various degrees.

Moreover in many instances entirely new characters not seen in either parent arise among the off-spring of succeeding generations of hybrids.

The study of these facts has led to many valuable results and the characters of hybrids are found to follow a certain definite law known as *Mendel's Law*. The following popular account of this law and the work which led to its discovery appeared in '*The Popular Science Monthly*' of April last, in the course of an article on 'the Red Sunflower,' by Professor T.D.A. Cockerell:—

"During the sixties, Gregor Mendel, Pralat at Brunn in Moravia, experimented with plants, especially garden peas. He was the first to appreciate the necessity of following up crosses for several successive generations, tabulating the results in each case, and ascertaining the numerical proportions of the differing forms resulting. He also took pains to consider the different sets of characters separately, treating them statistically as if they were different organisms. Working in this way, Mendel discovered that when two varieties are crossed the resulting hybrid is frequently not intermediate, but resembles one or the other parent. In other cases, when the hybrid, as a whole, seems intermediate, the several *characters* are nevertheless found to correspond with those of one or the other parent. When this sort of thing occurs, the character which comes uppermost in the cross is said to be *dominant*, the one which remains latent or hidden is called *recessive*. Inasmuch as fertilisation results from the fusion of the germ-cells of the two parents, it is evident that each individual hybrid must contain material derived from both, although only the characters of one parent may be visible. Now Mendel found that when hybrids obtained as described were crossed together in the next generation he got, in simple cases, three of the "dominant" type to one of the "recessive." Of course the proportions would not be always thus, but whenever the number of cases was large they approximated so closely to the three-to-one ratio, that he became convinced that this was no accident. A simple theory was formulated, according to which the results arose from the chance combination of the elements in the germ-cells. We may now make this clearer by a diagram in which D stands for the character which is dominant, R for that which is recessive.

First cross, DD x RR.

"This is written DD and RR, not simply D and R, because we are supposing that each individual is pure for the character involved, that is, has received D or R from each parent.

"First filial generation DR x DR x DR x DR, as many as there may happen to be. These are written DR because each gets D from one parent (which has nothing else to give) and of course R from the other. Now in the next generation each parent contributes, not its whole "DR," but one or the other, according to the laws of chance. Accordingly, DR x DR may produce a DD, or a DR, or a RR and as a mater of fact, they do so. Why should there he any particular numerical proportion? If we put black and white balls in a bag, and draw them out in pairs at random, the chances are equal that we shall get two alike, or two different. It is so with our crosses. The cases in which we get two alike may be of two kinds, both black or both white, or in the case of the crosses, both D or both R. The cases in which we get two different are necessarily alike, black and white, or D with R. Hence according to the law of chance, we expect in the third generation the following:—

1. Both alike, DD and RR.
2. Not alike, DR and RD, which are the same.

Now we have seen that because of dominance R does not show when D is present. so that a DR looks like a DD. Consequently, of the above four cases, *three* show the dominant character, and *one* (RR) shows the *recessive*. The whole diagram may now be reconstructed:—

1. DD x RR (original cross).
2. DR x DR x DR x DR (first filial generation).
3. DD x DR x RD x RR (second filial generation, or grand-children).

How can this be confirmed? Obviously, if the facts are as here given, the DD and the RR of the third line are now *pure*, in spite of the fact that the

DD had an RR grandparent and a DR parent, and the RR a similarly complicated ancestry. Take a number of these pure types, now called "extracted recessives" and "extracted dominants," and breed them separately, the DDs with DDs, and the RRs with RRs, and they *will breed true*, and their descendants will for ever remain true, unless contaminated by a cross or some new variation arises. The DRs. however, when bred together, will again produce the "three-to-one" results, just like their parents. Consequently, it is possible to extract a pure strain out of an impure one, a fact of tremendous scientific and practical importance."

RUDOLPH D. ANSTEAD, *Planting Expert.*

THE INDIAN AGRICULTURIST, MARCH 1, 1912.

One of the most valuable of recent contributions to the "Memoirs" of the Department of Agriculture in India has been issued in the form of a fairly bulky volume on the Food of Indian Birds. The enquiry was carried out by Mr. C. W. Mason, lately Supernumerary Entomologist, Imperial Department of Agriculture, and its final object was to elicit definite facts regarding the influence, beneficial or otherwise, of birds as a whole, and of each common bird. Though apparently it has been limited to local observations round Pusa, the enquiry has been very exhaustive, and its results may be taken to apply generally to the whole of India, inasmuch as, in Mr, Mason's words, in all probability "foods of widely distributed species differ but little in different localities." It is, therefore, of great interest to learn from the brief summary of the enquiry which Mr. Maxwell-Lefroy contributes to the Volume, that "in the main the birds common in Pusa are, from our point of view, beneficial," inasmuch as they assist the agriculturist by the destruction of harmful insects. Coming to details. there is a difference of opinion between Mr. Maxwell-Lefroy and Mr. Mason in regard to the crow. Mr. Maxwell-Lefroy would protect the crow, because it feeds on *Chrotogonus*, the very destructive grass-hopper, though "eight of the specimens dealt with ate frogs." Mr. Mason, on the other hand, says, that "crows cannot definitely be classed as beneficial, and require, if anything, to have their numbers kept within certain limits." But there is no doubt about the value of the King Crow, which is described as "a most important bird—far more so than the records seem to show," says Mr. Maxwell-Lefroy.

———:O:———

AMSTERDAM COFFEE MARKET IN 1911.

A British Consular report states:—

The past year was a most prosperous one for the coffee trade. The price of good average Santos rose steadily from 23 to 36¼c. per Dutch lb. during 1910, but in October, 1911, it suddenly rose to 45c., a figure which has not been reached since 1896. The cause of this extraordinary rise is to be attributed to the unfavourable reports regarding the 1911-12 and 1912-13 crops that have reached Europe.

Sales of coffee were considerable during the past year. The Dutch market was well supplied by arrivals from Santos for the Netherlands Trading Company, which sold 476,042 bags during 1911. . . .

765,699 bags of Santos coffee arrived at Amsterdam during 1911, of which the Royal Dutch Lloyd Steamship Line brought 543,911 bags direct from Brazil.

The use of coffee substitutes, chiefly coffee adulterated with chicory and roasted beans of various kinds, is increasing considerably in the Netherlands, probably in consequence of the rise in price of coffee berries.

CORRESPONDENCE.

Carbonic Acid Gas as a Coagulator.

Dear Sir,—With reference to your remarks in your issue of 25th May, concerning Dr. Pahl's claim to coagulate latex with carbonic acid gas, you may be interested to know the Chemists of the Rubber Growers Association in London (Malay Section) state in their 10th report—

> " Carbonic acid gas does not coagulate latex—this is of interest in
> " reference to Pahl's process—coagulation wtth carbonic acid gas
> " under pressure."

Chippenham, 16th June, 1912. (Sd.) BASIL S. CHAS. H. HANKEY.

Lime in Heavy Soils.

Sir,—The Quarterly Journal of the Indian Tea Association says that a lime containing carbonate will not have the same benefieial results on heavy soils as will lime which is free from carbonate. How is a poor planter to discriminate between the qualities of lime ?

Perhaps our ever obliging Scientific Officer would kindly suggest some simple methods of judging of the quality of lime.

NILGIRI PLANTER.

TEA IN FRANCE.

A Consular report on the Trade of Havre in 1911 states :—

The importations of tea at the port of Havre came to 2,187,360 lbs. in 1911, which showed an increase of 126,180 lbs. over the previous year. This increase is due to the importation by foreign firms who left a fair proportion in depôt or re-exported a further quantity. The French consumption of tea is still small and develops slowly.

The following table shows the imports and exports of tea during the last four years :—

	Imports. Lbs.	Exports. Lbs.
1908	1,415,319	204,892
1909	1,667,106	154,934
1910	2,061,180	361,176
1911	2,187,360	339,460

The details of tea imported during 1910 are as follows :—

From—	Lbs.
United Kingdom	42,020
British India	552,420
China	821,920
Indo-China	637,680
Other countries	7,140
Total	2,061,180

14,690 lbs. of tea was imported from the United Kingdom during 1911.

TEA.

New Season's China Tea.

After the disconcerting rumours of the last month or two anent the new season's crop of China tea—that the disturbed state of the country would prevent money being sent up to finance the growers, that the tea could not be brought down, that it would certainly be 30 per cent. or some said 50 per cent. short, that it would be greatly delayed, etc.—the fact now is that the business-like Chinaman has found other means to get his teas and finance them. We now know that the Hankow crop is a full one, that prices are higher than last year owing partly to the rise in silver, the higher rate of exchange, and also partly to the fact that the Russians have bought freely. We have already seen a good many samples of the new tea, and we think the first crop will prove a good one as regards quality and colour in cup, but that the leaf is not so good. Costs, however, are too high, and one cannot yet tell how much is coming to London. Anyhow, tea is coming here, but it is probable that it will come in driblets, and the first arrivals will be here, about the same time as last year. Finest grades are very short, but medium and common first crop is in full supply.

Despite the fact of the first crop being a full one, it does not follow that a large quantity is coming to this market. Until Russia has supplied her wants, prices may not come down sufficiently to induce buyers from this side to send out large orders; hence the reason we suggest that teas will come forward slowly. The news from Foochow is very meagre. Prices asked for the best Panyong and Ching Wos are very high, and no sales are reported—in the face of the recent forced sales of one of the best crops of Panyong we have seen of late years, at very low rates. No one in his senses is likely to operate in the new crop at quotations now being received. The first arrivals from Foochow must be several weeks later than last year. There is still a fair amount of good medium and fine tea left of the present season, which will keep the trade going for some time to come. and unless importers can sell their new teas at reasonable prices, we are afraid they will come to a very slow and dragging market. Anyhow, the reception of the new crop will be cool, and buyers will act with caution, until they find they have reason to alter their opinion and tactics.—*The Grocer.*

British Grown Tea in Europe.

The consumption of British-grown tea on the Continent of Europe is declining, notwithstanding the propagandist efforts of the last few years. The " Financial Times," in an article on the subject, says that the Continent consumes ¾ oz. per head per annum as against the 88 oz. consumed in the United Kingdom. Whether China and Java are supplying the Continental tea drinker, or whether tea-drinking is falling away rather than increasing, there is, unfortunately, nothing to show. Evidently there is ground here for inquiry. " The conclusion is," says the " Financial Times," " that something totally different from what has been hitherto tried is required. What that constitutes the problem to be solved, for it is not to be supposed that anyone connected with India will cease to believe in the possibility of converting some of these teeming European populations into tea-drinkers, however great may be the discouragement at the moment, nor is it reasonable to ask home contributors to depute the direction of the work to others." It would be extremely interesting, alike to the planter and the trade, to know what is wrong. Having discovered that, the situation might be dealt with. At present everyone is in the dark.—*Rubber World.*

RUBBER.

Plantation Crop Prospects.

The rapidly increasing supplies of plantation rubber are awakening fresh interest, not only among investors, but merchants and manufacturers in Europe. The increase from 500 tons for the whole of the year 1906 to one of over 500 tons every fortnight at the London Auction rooms seems to, at last, have had some definite effect on the minds of sceptical observers. We now frequently hear of many persons, who, up to recent times, looked askance at our predictions, openly acknowledging that the plantation industry has a backbone, that the crops are likely to have a marked effect on prices and consumption, and that the new source of supply in the Middle East in going to oust the two principal areas—tropical America and Africa—in point of quantity, quality, and even cash value.

At a recent lecture given at the Imperial College of Science, London, the writer showed that whereas Brazil required an interval of 30 years to raise its output from 31 to 1,800 tons, the Middle East, commencing with an export of 500 tons in 1906, turned out 14,000 tons last year. On the other hand, Brazil took from 1827 to 1887—60 years—to increase its export of rubber to 13,300 tons. During the present year—1912—we predict that the supplies of plantation rubber from the Middle East will be from 22,000 to 25,000 tons, this of pure rubber losing less than one per cent. from port of shipment to the manufacturers' rollers. Last year Africa produced 22,000 tons of rubber, many grades of which lose 20 to 40 per cent. in purification by manufacturers. It is, therefore, quite clear that the plantation crops for 1912 will exceed by a considerable amount the maximum yield over obtained from the whole of the African continent. Hitherto Africa has supplied about 25 per cent. of the world's crop, and the East only 10 to 15 per cent., made up of wild and plantation sorts. Henceforth the Indo-Malayan region will stand before Africa in point to production.

When then, will the plantation supply exceed that from tropical America of Brazil? The success for 1912 is only the fore-runner of a much more substantial one. Plantations should, within two years, actually produce more caoutchouc than the maximum crop from Brazil ever gave us. Take the Brazilian crop at 40,000 tons, and allow for a loss on washing of from 10 to 20 per cent., and you will see that the anticipated crop of 35,000 tons of plantations for next year or 1914 will easily come first.

In 1906, at the Ceylon Rubber Exhibition, the writer pointed out that the yield from the acreage then planted—250,000 acres—in the East would in about six years (1912) yielding at the rate of 1½ lb. per tree. give 25,000 tons. That same acreage will give a higher yield when one year older; new acreages planted in 1907/, and 1908 will also be in bearing next year, and a crop of 35,000 tons should, therefore, be obtained for 1913.

It is quite an easy matter to calculate the probable future crops from plantations from the statistics given in the 4th Edition of Wright's "Pará Rubber," now published. If ceylon, South India, and East Java are assessed at one ton per ten acres, and Malaya and Sumatra at one ton per five acres for trees seven years old and over, a fair estimate can be arrived at. We advise all whom it may concern to study the acreage statistics mentioned, and compile their own estimates of crops.

A few figures of planted acreages for particular years are here given:—

		Ceylon.		Malaya.
1897	...	650	...	350
1902	...	4,500	...	7,500
1905	...	40,000	...	38,000
1906	...	100,000	...	99,230
1907	...	150,000	...	179,227
1908	...	170,000	...	241,138
1909	...	174,000	...	292,035
1911	...	220,000	...	400,000

To these must be added 80,000 acres of Hevea in Sumatra, 160,000 acres in Java, half of which is Hevea, 42,000 acres in South India and Burmah, and fair-sized plantations in Borneo, German Colonies, and tropical America. After deducting 80 per cent. for failures, and not allowing for new extensions, an area in bearing of at least 800,000 acres may be anticipated.

Our readers will observe that we have suggested a range of from one ton per ten to one ton per five acres for the various countries. We are quite aware when doing this that many estates have given 500, 600, 700 and over 800 lbs. per annum, but we also know that many properties are not so favourably situated as those whence such magnificent corps have been derived. Furthermore, we do know that many estates, including some of those most popular among investors to-day, have been treated as though their powers of endurance and reciperation knew no limit. We feel convinced that many trees cannot have their bark tapped with that regularity which is desirable, for the simple reason that material which should have lasted twenty-four months has been used up in about half that time. There has also been a large amount of eyperimental tapping on estates yielding virgin crops, which has resulted in the production of ugly wounds and irregular sufaces over which tapping cannot be repeated until a long rest has been given the trees. It is true that many London companies have recently sanctioned the application of large quantities of manure in order that cambial activity, on which the formation of renewed bark depends, may be stimulated. All these factors convince us that an average annual yield over a large number of years of from 300 to 400 lbs. of rubber will be as much as we can reasonably expect, if we are not to permanently depreciate the trees—the company's asset—on estates.—*India-Rubber Journal.*

Portuguese East Africa.

The following information is from the report by H. M. Consul at Lourenco Marques (Mr. R. C. F. Maugham) on the trade of the Portuguese Possessions in East Africa in 1911.

Rubber.—Various varieties of indigenous rubber occur in certain parts of the Mozambique Province, its collection being principally in the hands of Indians. One British firm has obtained a concession over the extensive forests south of Angoche, but it is believed that this is the only European undertaking of the kind in active working. The rubber is extracted from various *Landolphia* vines and is of moderately low grade; it is shipped largely to Hamburg, and is worth perhaps not more than 3*s.* 6*d.* to 6*s.* per lb. Large quantities of Ceará rubber have been planted in the Quilimane district and appear to be developing satisfactorily. H. M. Consul regards it as quite impossible for European associations and individuals to compete for the purchase of indigenous rubber with the Indian trader; such attempts as have been made have invariably resulted in failure. The collection of the product is made by Asiatics, who either dispose of it to European trading firms or ship it direct to Europe on consignment.

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Scientific Officer's Papers.

CVI—PLANT BREEDING.

The majority of the common vegetables, fruits and cereals that are grown to supply the food of mankind, have been under cultivation for many thousands of years and their origin is unknown and lost in the mists of antiquity During this time they have undergone extensive modifications. In many cases the wild species from which they have been developed can be recognised and on comparing the cultivated varieties with these wild species it is seen that the former differ from the latter in possessing a greater development and improved flavour of those parts for which they are grown, the other parts of the plant being much the same. This change of development has been brought about by the agency of man, and at the present time endeavours are constantly being made to improve all cultivated food plants.

This work is done by several different methods. An important peculiarity of all living things is the variability of their sexually produced offspring, and among cultivated plants this variability is often considerable. A seedling which differs very appreciably from the characters of its parents is known as a *seminal sport* and it occasionally happens that one of these possesses characters of sufficient novelty, or usefulness, to render it worth cultivating. Many improved varieties of food plants have been in the past and are being in the present obtained by cultivating such seminal sports. On sowing the seeds produced by such a sport the majority of the seedlings will be found not to inherit its peculiar and desirable characters, but some few will do so. It is, therefore, necessary to 'fix' the type and this is done by a process known as *Selection*. The following is a good description of this method quoted from a standard text book of Agriculture:—

"The seeds of the plant showing the new features are sown and those individuals of the offspring possessing the same peculiar characters as the parent are allowed to produce seed, all others being pulled out and discarded. The seeds of this first selected generation are then sown and a further selection and sowing of those possessing the new attributes is made. This process is repeated for several generations until no weeding out is found necessary, that is until the new characters become constant in all the offspring, after which the variety is said to be 'fixed' and 'comes true' from seed. The time taken to fix a variety in this manner depends upon the power which the plant possesses of transmitting its characters to its offspring. This power is exceedingly variable and no rules can be laid down in regard to it; in some instances 50 per cent., or more, of the first generation may resemble the parent and on sowing the seeds of these 90 per cent. of the seedlings may 'come true.' In such cases fixation of a new variety is tolerably easy and may be effected in three or four generations. In other cases the number of plants true to type in each succeeding generation may be very small and even after selection has been carried on for many generations a large proportion of the plants obtained at each sowing may possess none of the characters of the variety which the plant breeder wished to obtain."

The method of selection is evidently adopted more to annuals than perennials. If several years elapse before each succeeding generation bears seed, as in the case of Coffee or Rubber for instance, the fixing of a new variety is a long tedious business.

Variations in cultivated plants can be induced to a large extent by varying the external conditions of the plant and by crossing and hybridisation and these are the methods most usually employed to obtain new types, more especially in the case of perennials and plants which take a long while to reach the seed bearing stage.

The most certain method of inducing variation in a plant is to cross it with another individual. There is a mixing of the protoplasm of two distinct plants and the offspring, therefore, consists of living matter derived from two distinct and unlike sources. Variations produced in this way are much more frequently hereditary than characters produced by the action of external conditions and these variations can be further increased by method of selection. Not only is crossing of use for the purpose of inducing variability among plants so that selection may be begun but it is often resorted to in order to combine in one variety of plant characters previously possessed only by two different and separate varieties. A delicate variety of good quality when crossed with a hardy variety of poor quality sometimes gives rise to a hybrid combining the good quality of the former with the vegetative vigour of the latter. The hybrid having been obtained may be fixed by selection methods or reproduced vegetatively by means of cuttings, or grafts.

RUDOLPH D. ANSTEAD,
Planting Expert.

It is almost refreshing to read a statement by the Chairman at a plantation company meeting which does not announce that everything else is being cut out in the interests of rubber. In the whirligig of economic time no one can say whether rubber a few years hence may be earning more or less than tea or coffee. At any rate the Directors of the New Kali Selogiri (Java) Plantations are doing so well with Robusta coffee and prospects are so good that they have no thought of abandoning a fine source of revenue in order to bring rubber on more quickly. The circumstances are, of course, somewhat exceptional. "There is," said Mr. deCourcy Hamilton, "no hiding the fact that coffee somewhat retards the growth of the rubber trees, more especially during the earlier years, but as our estate is particularly favourable for Robusta coffee, rubber must take second place for the time being; and as our rubber is wide planted it will not overshadow our coffee for, say, six or seven years from planting, so we may look forward to good coffee crops for some years to come." And if the necessary labour can be obtained, it is the intention of the Board to open more land a little later and plant it with coffee only. The rubber is doing very well, but there is clearly no intention to sacrifice immediate and tangible advantage for prospective gain.—*The Rubber World.*

DISTRICT PLANTERS' ASSOCIATIONS.

Mundakayam Rubber Planters' Association.

Minutes of the General Quarterly Meeting held at Aneikolam Bungalow at 11 a.m., on Saturday, July 13th, 1912.

PRESENT.—Messrs. J R. Vincent, (Chairman), G. H. Danvers Davy. (Vice-Chairman), H. Byrne, E. E. Eyre, R. A. Fraser, E. R. Gudgeon, C. Byng Hall, F. H. Hall, J. M. Henderson, F. A. W. Meumann, K. E. Nicoll, W. P. Rogers, J. A. Richardson, E. R. Reid, F. Simmons, M. Smith, N. J, Strachan, R. Tait. E. B. Tapsell, F. E. Vernede, G. West, J. Wedderspoon, and A. C. Vincent (Honorary Secretary),

Minutes.—The minutes of the last meeting were taken as read.

Resignation of Honorary Secretary.—Mr. A. C. Vincent announced that the pressure of his other duties precluded him from continuing as Honorary Secretary. His resignation was accepted with regret.

Appointment of Honorary Secretary.—Mr. E. Vincent was proposed and elected unanimously.

New York Rubber Exposition,—The Chairman explained that as the machinery on most of the Estates was only in course of erection, members could not send in machine-made samples in time for the exhibition. It was resolved: "That the Honorary Secretary be requested to write to Mr. Staines Manders regretting the inability of the Association to send exhibits owing to the fact referred to."

Local Annual Subscriptions.—The Honorary Secretary was requested to call in these at once.

Delegate to the U. P. A. S. I.—Mr. G. H. Danvers Davy was proposed and unanimously elected to represent the association at the forthcoming meeting on August 12th, which he kindly consented to do.

Instructions to the U. P. A. S. I. Delegate—The delegate was instructed as follows:—*U. P. A. S. I. Agenda No. 7 A Prevention of Thefts of Tea.* To vote for legislation.

8. *Scientific Department*—To support all suggestions for increased efficiency, excepting those of a financial nature which should be referred to the Association for its decision.

9. *Duties.*—To use his discretion with regard to the coffee cess and popularisation schemes, and to support the proposed export duty on Bones.

11. *Tea.*—To support the majority.

13. *International Rubber Exhibition, London 1911.*—To refer to the disposal of the funds subscribed to this exhibition.

14. *Labour.*—To put the views of the M. R. P. A. as strongly as possible with regard to recruiting and emigration, enticement of advanced labour to emigrate, and non-service of warrants.

Roads.—The Honorary Secretary was requested to draw the attention of the Division Officer, Kottayam Division, to the bad state of the Kanjirappalli-Erathupettah cart road. and to the state of the Kottayam to Kumili road between Kanjirappalli and Mundakayam. It was pointed out that Government have lately put a Toll gate on the Kottayam-Kumili Road, and that the public in consequence deserved to have the road kept in better order than has hitherto been the case.

Post and Telegraph Office at Erathupetta.—It was resolved to support Mr. Asher in his request for a Telegraph Office to be established at Erathupetta, and that the Post Master should be empowered to register and insure parcels, and receive moneys for the Post Office Savings Bank.

Toll Charges at Kanjirappalli.—It was resolved that the Honorary Secretary should write to Government pointing out that a second charge is made on vehicles passing through the gates when the return journey is made the same day, and to request him to ask Government to reduce the charges so that a vehicle returning through the gates within 24 hours would pay only one Toll, instead of two, as at present.

Motor Transport Scheme.—It was proposed and unanimously decided :- "That a Committee consisting of Messrs. K. E. Nicoll, G. H. Danvers Davy, E. E. Eyre, and J. R. Vincent, with the Honorary Secretary Ex-officio, be formed to represent Mundakayam on the Committee to discuss and go into the details of the scheme as proposed by Mr. Richardson."

Legislative Council Member.—The Association recorded its appreciation of Government's kindness in appointing a planter, Mr. Richardson, to the Legislative Council, and heartily thanked Mr. Richardson for accepting the work.

Association Rules.—It was resolved: "That the General Committee go into and investigate the rules of the Association, and if necessary, suggest and advise amendments."

Correspondence.—The following were then read :—

(1). A letter from the U. P. A. S. I. showing that the whole of money subscribed for the Rubber Exhibition, 1911, was not spent, and stating that the amount due to the Association has been credited to its annual U.P.A.S.I. account. The Association recorded its regret that the whole of the money was not allotted to the purpose for which it was obtained. It was also remarked that the pamphlet and photographs received by the U. P. A. S. I. from London had not been sent around to the Associations concerned.

(2). Letters from Messrs. R. A. Fraser and N. J. Strachan, with regard to the arrest of Mr. A. Hamond, saying they had received no reply to the representations made to the British Resident. The Honorary Secretary reports that he also had not received reply to his letter on the subject. It was resolved that the Honorary Secretary should put the matter before the Government and ask for an early reply.

(3). Letters with regard to the importation of Tobacco into Travancore. The legality of *two* import duties was questioned.

(3). A letter from the South Travancore Planters' Association, with reference to the establishment of a Federation of the three Travancore Associations. It was pointed out that

(*a.*) Seceding from the U. P. A. S. I. the local associations would be deprived of the benefit of the attendance of the planting member in the Madras Legislative Council,

(*b.*) there would be no direct way of appealing to the Imperial Government on any question and that (c.) as His Highness' Government has kindly appointed Mr. Richardson as a member of the Travancore Legislative Council to represent the Planters' Associations, any representations to His Highness' Government could be made through him. It was, therefore, unanimously decided that the Mundakayam Rubber Planters' Association cannot entertain any idea of secession from the U. P. A. S. I. and the Honorary Secretary was asked to put these views and the Association's decision before South Travancore Planters' Association.

(5). A circular letter from the C. M. S. which was handed to members to read and reply to individually.

(6). A letter from the Excise Commission with reference to the granting of liquor licenses in Mundakayam. It was proposed and carried "That Government be requested to kindly grant two licenses for 1912 and 1913, one to Messrs. J. P. Zachariah & Co., at the 35th mile, and the other to Messrs. S. P. Mel & Co. at the 33rd mile, near the Travellers' Bungalow." It was pointed out that a license is particularly desirable near the Travellers' Bungalow for the convenience of Travellers, and that it is not desirable to have two licensed houses at the 35th mile, within a few yards of each other.

(7). A circular letter from the U. P. A. S. I. with regard to rubber for the Imperial Institute. It was resolved: "That members should each bring a sample of the different kinds of rubber made by them, to the next meeting of the Association, and that the best be picked out by one or two members acting as judges, and sent to the Imperial Institute."

Date and Place of next Meeting.—It was proposed from the chair and seconded by Mr. G. H. Danvers Davy: "That the next meeting be held in the Travellers' Bungalow on the first Saturday in November 1912."

The meeting terminated with votes of thanks to Mr. Danvers Davy for acting as delegate to the U. P. S. I., to the retiring Honorary Secretary Mr. A. C. Vincent for his services, and to the Chairman for presiding.

(Signed) J. R. VINCENT,
Chairman.

(„) EDWIN VINCENT,
Honorary Secretary.

Coorg Planters' Association.

Minutes of the Proceedings of the Annual General Meeting held in the Club House, Mercara, on Thursday, July 11th, 1912.

PRESENT.—Messrs. Tipping, Bracken, Gerrard, Grove, Tweedie, Grant, W. R. Wright, Alexander, Mahon, Graham, Jackson, Maclean, Macrae, Hamilton, Cox, H. C. Wood, Irwin, Morgan, Hallett, Elsee and W. M. Ball (Honorary Secretary.)

Mr. Ball was unanimously voted to the Chair.

The result of the Ballot for Officers for 1912-13 was:—

President ... Mr. C. E. Murray-Aynsley.
Honorary Secretary ... Mr. W. M. Ball.

Committee North Coorg.
Messrs. J. A. Graham.
„ J. W. Irwin.
„ C. G. Maclean.
„ W. E. Tweedie.
„ Talbot Cox
„ G. R. Pearce.

South Coorg.
Messrs. E. L. Mahon.
„ A. H. Jackson.
„ H. G. Grant.
„ F. Macrae.
„ W. A. F. Bracken.
„ F. W. Gerrard.

Messrs. A. J. L. D'Beirne and C. Legard were elected members of the Association.

The Honorary Secretary read the report for past year and laid the accounts before the meeting. Mr. Bracken proposed and Mr. Tipping seconded: "That the accounts be passed."—Carried.

It was decided that owners are liable for subscription though absent from Coorg, this does not apply to Superintendents absent on leave.

Mr. Graham proposed and Mr. Tweedie seconded: "That the Association do join the Lady Ampthill Nurses' Institute, the subscription to be raised amongst the members."

Mr. Elsee proposed and Mr. Graham seconded: "That the Honorary Secretary do ask the District Magistrate if he cannot see his way to extending the time limit for obtaining warrants against defaulters under Breach of Contract Act."

The Honorary Secretary read draft of proposed bye-laws for regulation of traffic on the roads.

Mr. Mahon suggested: "That the Honorary Secretary approach Government in the matter of the better up-keep of the Cannanore Ghât road and that more money be allotted and that halting places be made at shorter intervals."

Mr. Mahon brought up the matter of the Pollibetta Telegraph Office and proposed: "That Government be asked to raise it from a 3rd to a 2nd class office."—Carried.

Chairman read agenda of next U. P. A. S. I. meeting.

Mr. Macrae suggested that the question of a Paid President for the U. P. A. S. I. be brought up at the Conference.

Mr. Jackson proposed and Mr. Tipping seconded: "That the delegates to the U. P. A. S. I. do bring up the matter of the weights of manures and propose that the Coast Firms be asked to charge on the weights of manures as delivered on the Estates."—Carried.

Mr. Bracken proposed and Mr. Hamilton seconded a vote to the Chairman which closed the meeting.

REPORT FOR THE YEAR 1911-12.

Gentlemen,—You have the accounts before you and as you will see there are only two members in arrears with their subscriptions. This, I think, is very satisfactory. The Association now consists of 54 members.

Scientific Officer.—The great feature of the year was the successful carrying through of the Scientific Officer's Assistant scheme. We now have 22 subscribers representing 13,734 acres. Mr. Jonas, a young man with good scientific training, has been engaged and should arrive early in October. The Council of the Mysore Associations invited delegates from Coorg to their meeting on 25th May last at Chickmaglur to meet Mr. Frattini, their newly arrived Scientific Officer's Assistant. Mr. Graham and myself accepted; an unfortunate accident, however, prevented Mr. Graham completing the journey. I went on alone to Chickmagalur where I had the pleasure of being introduced to Mr. Frattini and derived much profit from the discussions as to his work. Your Committee has accepted the offer of the Kali-Syndicate to give £100 for manurial experiments; for the carrying out of which arrangements will be made by Mr. Anstead on Mr. Jonas' arrival.

Roads and Communications.—Railway to Coorg.—As the Mysore Durbar has engaged Mr. Bell to advise them as to Railway extensions in Mysore the time seemed to me propitious to bring up the subject of a Railway to Coorg. I therefore have written to our Commissioner asking him to bring the matter before the Chief Commissioner and if possible to have us put in communication with Mr. Bell. Our roads have been well kept up on the whole and a considerable number more mile coolies are being supplied by Planters greatly to the improvement of the roads. I hear from Mr. Graham that the Sidapur-Suntikoppa road will be completely open immediately after the rains and Mr. Jackson tells me the Sidapur-Pollibetta road is being traced and there is, so far as he knows, no obstacle to its early completion.

Pepper Stealing Prevention Fund.—Mr. Bracken informs me nothing of interest happened during the year. The balance in hand is Rs.94-12-0.

Coffee Stealing Prevention Fund.—Mr. Macrae reports that only one case was brought to his notice during the year. In this case all the accused, some coolies and the Estate Writer, were convicted by the Subedar, but the District Magistrate quashed the conviction of the Writer on the grounds that the evidence against him was not conclusive.

Mr. Macrae now awaits a copy of the judgment before asking the Committee to sanction some rewards. The balance in his hands is now Rs.52-9-9.

General.—Three hundred Labour Circulars in Canarese were received and distributed and it is hoped those in Tamil and Malayalam will soon be available. The non-service of warrants is still a great and growing grievance.

(Signed) W. M. BALL,
Hony. Secretary, C.P.A.

Various indigenous rubber plants occur in certain parts of the Mozambique Province, the collection being principally in the hands of Indians. One British firm has obtained a concession over the extensive forests south of Angoche, but this is, I believe, the only European undertaking of the kind in active prosecution. The rubber is extracted from various *Landolphia* vines and is of moderately low grade; shipped largely to Hamburg, it is worth perhaps not more than 3*s.* 6*d.* to 6*s.* per lb. Large quantities of Ceará rubber have been planted in the Quilimane District and appear to be developing satisfactorily. I regard it as quite impossible for European associations and individuals to compete for the purchase of indigenous rubber with the Indian trader. Such attempts as have been made have invariably resulted in failure. The collection of the product is thus made by Asiatics, who either dispose of it to European trading firms or ship it direct to Europe on consignment.—*Diplomatic with Consular Reports.*

CORRESPONDENCE.

Lime in Heavy Soils.

Sir,—In reply to the letter of "Nilgiri Planter" in your issue of 27th July the following notes may be of use.

The Lime applied to the fields should be in the form of water slaked lime and should be reasonably pure calcium hydroxide, nearly free from carbonate. Water slaked lime has a markedly alkaline reaction and hence neutralises quickly any acidity which may exist in the soil. It also acts quickly in liberating plant food, particularly nitrogen. It is for these reasons that hydrate of lime should be used instead of carbonate of lime.

Simple tests for the purity of any sample of lime which can be carried out on the estate are not easy to devise. If the Lime is purchased as quick (unslacked) lime, the following is a rough and ready test which may be applied. Weigh out half an ounce of it, and put it into a tumbler. Take the temperature of some water with a thermometer, measure out two tablespoonsful of it and pour on to the lime. Stir the mixture with the thermometer and note the final rise in temperature. Under these conditions good quick lime should slake readily, that is combine with water to form calcium hydrate, and should give out enough heat to raise the temperature about 27° F.

To test whether the sample is free from carbonate a little acid, such as hydrochloric acid which can be bought at a druggists, should be poured on to a little of the lime in the tumbler; if carbonates are present an effervescence will be produced.

Probably the best way for the "poor planter" to ensure that he applies good lime to his land is for him to purchase it from a reliable source in the first instance and take care of it when he has got it. It should be applied as soon as possible, and if stored it should be kept carefully protected from the air. Air slaked lime contains a lot of carbonate because the carbon di-oxide gas in the air combines with the calcium oxide to form calcium carbonate. For the same reason the slaked lime should be covered after it is applied, either by lightly forking it into the top two or three inches of soil or by covering it over with mulch.

RUDOLPH D. ANSTEAD, *Planting Expert.*

Purification of Camphor.

In an article recently produced in the *Planter's Chronicle* describing the distillation of camphor it was stated that, the crude camphor may be purified by sublimation, being heated with a mixture of Lime or Charcoal, and the pure camphor collected in the form of "flowers" from a bell jar.

A correspondent writes asking how this purification process should be conducted.

The impure camphor should be mixed with about its own bulk of Lime, which acts as a drying agent, or powdered charcoal, and spread out in a thin layer on a copper plate and covered with a glass bell jar supported at a little height above it. Heat should then be gently applied to the plate. The Camphor in the mixture will then evaporate, or sublime, leaving the impurities behind and the vapour will condense on the cool sides of the bell-jar in a pure powder-like form known as "flowers." When the process is complete and no more camphor sublimes off the bell-jar is removed and the pure camphor collected from it.

RUDOLPH D. ANSTEAD, *Planting Expert.*

PLANTERS' ASSOCIATION OF CEYLON.

Committee Meeting.

Extracts from the Minutes of the Proceedings of a Meeting of the Committee of the Planters' Association of Ceylon, held at Kandy, on Friday the 12th July, 1912, at 2-30 p.m.

RUBBER SHIPMENTS AND STRONGER CASES.

Laid on the table the following circular received from the Secretary of the Rubber Growers' Association.

C. Taylor, Esq., Secretary, Rubber Growers' Association, Oxford Court, E. C.

PACKING OF RUBBER.

Sir,—With reference to my letter of the 28th March last, upon the above subject, I beg to hand you herewith a copy of letter addressed to this Company by the Commander of the P. & O. s.s. "Sumatra" to which I would call your particular attention.

Yours faithfully,
(Signed) J. MORTLEMAN,
Secretary,
Homeward Japan, China and Straits Conference,
8, Billiter Square, E.C., May 28th, 1912.

"I beg to draw your attention to the condition in which the rubber shipments have been received in Port Swettenham and the packing of this valuable cargo, as out of a shipment of over 1,700 cases at least 100 were either in a damaged condition or damaged by handling, the latter not due to carelessness but owing to the frail nature of the cases. In the majority of cases the rubber is packed in a cheap brittle wood case, the ends being dovetailed, with a narrow iron band on the extreme edge. When a sling of even six cases is landed on the hatches the mere fact of landing them starts the dovetailing; and forces the ends open, and owing to the springey nature of the contents, and the brittleness of the wood, it is impossible to repair them in a proper manner (unless the contents are put in cases, which was done with the three worst this time) the consequence being that the contents are left more or less exposed and liable to pillage.

"We keep all the rubber we can in the lock up, but shipments are now so large that a certain amount is in the holds, and if damaged and exposed it leaves a great risk of pillage. Will you respectfully allow me to suggest that it should be put to the shippers to put, say, three bands round their cases one way, and two across, as it is done by some shippers in Colombo —or to pack them in Venesta cases like the Highlands and Lowlands Estate for it is surely to the shippers' interest to have their cargo landed in good order."

DESTITUTE TAMILS IN COLOMBO.

Read letter from the Rev. P. Middleton Brumwell, Secretary of the Friend-in-Need Society, on the subject of destitute immigrants.

Resolved :—" That the Secretary of the Planters' Association do write to Mr. Brumwell thanking him for his letter and promising hearty co-operation in any practical scheme for assisting these persons which he can suggest. It was pointed out that while doubtless some beggars had at one time been coolies on estates they had not been turned off estates, but were almost always coolies who had bolted."

COAST AGENCY.

The appointment of Mr. H. Scoble Nicholson to be Ceylon Labour Commissioner which was made by the Coast Agency Committee at the meeting held in the morning was made known to the General Committee, and met with unquestioned approval.

The Chairman intimated to the Committee that though they were not the appointing body of the Coast Agency Committee, nevertheless, he wished them to have full information on the matter of the dismissal of Mr. Norman Rowsell from the post of Labour Commissioner. He detailed the facts leading to the above action of the Coast Agency Committee; informed them of the amount of the losses incurred, and invited the members present to ask any questions.

The meeting accepted the Chairman's statement without question.

An extract of a letter from the Ceylon Labour Commissioner (Mr. C. G. Ryan) was read showing that the present year is an exceptionally good one for the recruiting of labour from the Coast.

(*Extract referred to*)

"The number of coolies passing through Trichinopoly in June was 12,546, a record. In May the number was 11,717, or 24,263 in the two months. The total for the six months is 42,338 as compared with 30,690 for the same period of last year."

It was resolved :—"That Messrs. Ford, Rhodes, and Church be written to and cordially thanked for their assistance in the matter of an audit held in Trichinopoly of the Ceylon Labour Commission accounts and for their able report."

It was also resolved :—"That Mr. C. G. Ryan be informed of the Association's deep sense of obligation in the matter of the great services he has rendered them, and that he be elected an Honorary life member of the Planters's Association of Ceylon, the presentation to be made at a general meeting."

Portions of a circular said to have been issued by the United Planters' Association of Southern India and forwarded by the Nuwara Eliya District Planters' Association were read, and the Secretary was directed to forward the same to the Ceylon Labour Commissioner with a request for his suggestions as to what steps, if any, it would be advisable to take to remove any false impression that may have been created against emigration to Ceylon.

ORDINANCE No. 9 OF 1909.

Read letters from the Kelani Valley and Kegalle District Planters' Associations on the subject of the feasibility of including all employers of labour under this Ordinance, and it was intimated that the members of the Joint Labour Conference—held in Colombo on April 27th, 1912—had discussed this matter and by a majority had come to the conclusion that this was not at present practicable.

Read letter from the Colonial Secretary enclosing copy of a letter from the Chief Secretary of the Federated Malay States inquiring as to the success or failure that has attended the introduction of the discharge ticket (Ordinance No. 9 of 1909) system which is now in force in Ceylon. Resolved :—"That this Committee is of opinion that the discharge ticket system is working very well in Ceylon."

RUBBER

Mid-East Hevea Rubber Prepared in the Brazilian Manner.

AN ANALYSIS.

The latest number of the "Bulletin of the Imperial Institute" contains some valuable information as to the constituent elements of Mid-East Hevea rubber, when prepared by the Brazilian method, which method retains all the solids of the latex.

The writer of the article says:—Two small specimens of smoked Pará rubber from the Botanic Gardens at Singapore, representing a consignment offered for sale in the United Kingdom, were forwarded for examination to the Imperial Institute by brokers in London, who stated that the rubber had been prepared experimentally by the Brazilian method of smoking. On examination in the usual manner it was found that the rubber contained a very high percentage of "resin," (*i.e.* matter soluble in acetone), amounting to 5·2 per cent. on the dry material. This proportion of resin is very much higher than is usually present in Pará rubber from the East, but owing to the smallness of the samples supplied to the Imperial Institute it was not possible to investigate the matter in detail. Subsequently, however, a large specimen of smoked rubber, carefully prepared from the latex of a single tree by the same process as that employed for the earlier specimens, was forwarded for further examination to the Imperial Institute by the Director of the Botanic Gardens at Singapore.

The specimen consisted of a spindle-shaped piece of smoked rubber, weighing 6 lbs., which was almost black externally but whitish within when cut. The rubber was rather moist, and a quantity of brown viscous liquid was present between the concentric layers.

An analysis of the rubber gave the following results:—

	Rubber as received per cent.	Composition of dry rubber. per cent.
Moisture	7·4	...
Caoutchouc	84·6	91·4
Resin	4·4	4·8
Proteid	2·9	3·1
Ash	0·7	0·7

The percentage of "resin" present in the dry rubber was a little lower than that found in the previous samples (4·8 per cent. compared with 5·2 per cent.), but was still very much higher than the amount usually present in plantation rubber from the East.

An examination was made of the portion of the rubber dissolved by hot acetone, and it was found that a large quantity of a solid crystalline substance, which was soluble in hot water, was included with the resin. This substance amounted to no less than 2·7 per cent. of the dry rubber so that the true figure for the percentage of resin in the dry rubber was only 2·1 per cent. instead of 4·8 per cent.

The crystalline substance was submitted to a detailed examination and proved to be a carbohydrate, which was indentified as *laevo-methylinosite*. The presence of this substance in the aqueous portion of the latex of *Hevea brasiliensis* remaining after the coagulation of the rubber had been recorded previously by De Jong, and closely allied carbohydrates are known to occur in other latices. The presence of such a large amount of the l-methylinosite in this specimen of Pará rubber is no doubt to be attributed to the method of preparation employed, whereby the whole of the solid constituents of the latex remain in the rubber, whereas in the usual method of coagulation adopted in the East the rubber separates from the aqueous portion of the latex, which retains the soluble constituents in solution.

In order to complete the investigation, a supply of the latex of the same tree from which the rubber had been prepared was obtained from Singapore. The aqueous portion of this latex, after separating the rubber, was found to contain a quantity of the 1-methylinosite, amounting to 0·46 per cent. of the total latex. The presence of this carbohydrate has also been proved in fine hard Pará rubber from South America.

The results of this investigation are of considerable practical interest as showing that in the analysis of rubber prepared by the Brazilian method (or by any method which leads to the inclusion in the rubber of all the solid constituents of the latex) it will be necessary to take into account the possibility of other substances besides resin being extracted from the rubber on treatment with hot acetone.—*Rubber World.*

Where Rubber Comes From.

It is quite apparent says the *India Rubber Journal* that a considerable interest is now being evinced not only in the geographical distribution of various rubber-yielding trees, vines and shrubs. but also in the characteristics of the plants yielding rubber in different areas. If we can only have a sound knowledge of the actual structures wherein latex accumulates in the plants it is quite conceivable that many improvements may be effected, particularly in the methods of tapping and the periodicity of tapping operations. In the distribution of rubber plants there is quite a good deal to learn, and information is already at hand which may throw some light on the climatic environments most desirable for the different species. For instance, we find that though Hevea brasiliensis is characteristic of certain forests in the Amazon region, it is to some extent replaced by other species as one goes north. Manihot also replaces Hevea generally in North Brazil and Bahia, Sapium replaces Manihot in Honduras and the Guianas, and Castilloa replaces Sapium in Central America and Mexico. It is true that many of these species overlap one another in their distribution, and if one studies the climatic conditions in each area where there is a predominant type, one can learn a good deal which may be of use in planting operations later.

CLASSIFICATION ACCORDING TO HABIT.

There are many systems of classification which are adopted in a study of caoutchouc-yielding plants. One of the most popular is that according to habit; in this three groups are distinguished, *viz.*, trees, timbers and shrubs. In the tree forms we have Ficus elastica in the Malay Archipelago, which grows to an enormous height. We have Castilloa, a handsome tree characterized with very rapid growth in the first four or five years, common in Central America and Mexico. There is the genus Manihot in North Brazil and Bahia, which provides a well-branched tree. In Africa, the genus Funtumia is responsible for many trees, and in Brazil Hevea is predominent. Hevea and Ficus are large forest types, the smallest are probably Funtumias and Manihot, Castilloa coming midway between these groups. Among the climbers we have the Landolphia vines of Africa and Madagascar, the genus Forsteronia in the West Indies, and Parameria in the Middle East. The first-mentioned genus is, of course, the most important among the vines; it is exclusively African, and is responsible for rubber of high quality. Among the shrubs there is really only one example, Parthenium argentatum, the Guayule shrub so well known as a source of useful rubber.

(*To be continued.*)

The Planters' Chronicle.

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THE U. P. A. S. I.

(INCORPORATED.)

The Secretaryship.

Mr. Fletcher Norton has arrived in Bangalore and assumed his duties as Secretary of the U.P.A.S.I. on 2nd August.

The U. P. A. S. I. Exhibition.

Mr. G. N. Frattini, the Scientific Assistant for Mysore, will arrive in Bangalore on or about the 8th August in order to take charge of the Exhibition, which it is proposed to hold as usual in connection with the Annual Meeting. Mrs. Abbott and Mr. W. H. Reed, who have also kindly consented to give their help, have been appointed a Committee to act with Mr. Frattini and arrange the exhibits and generally take charge of the Exhibition.

The Indian Tea Cess.

The Secretary of the Indian Tea Cess Committee writes as follows:—

"The question of the renewal of the cess for a further period has recently been engaging the attention of the Cess Committee, who have been in correspondence with the Indian Tea Association and with the various members of the Cess Committee regarding it. The Committee of the Indian Tea Association (London) have expressed themselves as being unanimously of opinion that the renewal of the cess should be applied for and the General Committee of the Indian Tea Association, Calcutta. have also expressed the same opinion. So far as the Cess Committee is concerned, the Executive Committee are also of that opinion and the representatives of the following District Associations have recorded the view of the Associations they represent, to the effect that a renewal of the cess should be asked for:—

The Assam Branch, Indian Tea Association.
The Darjeeling Planters' Association.
The Dooars Planters' Association.
The Terai Planters' Association.
The Dehra Dun Planters' Association.

"The views of the Surma Valley Branch Indian Tea Assosiation have not yet been received.

2. "The Executive Committee recently circularised the various members of the Cess Committee on the subject with a view to ascertaining the feeling of those represented by them, but no reply has been received from Mr. Carson Parker, the representative of your Association, and it is

thought possible that he has gone home. Should this be so I am directed to ask if you will be good enough to inform the Cess Committee whether the United Planters' Association of Southern India are in favour of a continuance of the cess. A very early reply is requested as it is desirable that there should be as little delay as possible in approaching Government in the matter. And I am directed to add that the Executive Committee need hardly say that they hope that your Association will support the proposal for a continuance of the cess. In this connection I am directed to send you a copy of a note on the subject by Mr. H. S. Ashton, London: Mr. Ashton would prefer that his note should not be published in any way."

Mr. A. D. Jackson, Madras, writes:—

"I have received from the Indian Tea Cess Committee a copy of their letter of 27th instant addressed to your Association and I have been asked to assist if possible in obtaining for the subject matter of it an early and favourable consideration. I understand that the Association's own representative, Mr. Carson Parker, is at home on leave.

"I may mention that the Madras Chamber of Commerce, which I represent on the Cess Committee, has expressed itself favourable to a renewal of the Cess and its opinion that hitherto the Cess Funds have been well administered to the considerable advantage of the Indian Tea Industry."

Hemp Cultivation.

The Acting Director of Agriculture, Bombay, has kindly forwarded for publication the following extract from a letter written by Mr. Alfred Wigglesworth of Messrs. Wigglesworth and Co., 82 Fenchurch Street, London E.C. dated 17th May 1912 addressed to Major A. T. Gage, I.M.S., Superintendent, Royal Botanic Garden, Calcutta.

"We think that a very great future could be made for the Hemp trade in India if they would adopt better methods of preparation. For instance, in the philibhit district there is no earthly reason why they should "ret" this material in muddy water, if not in mud, as it results in deteriorating the strength of the fibre and in filling it up with such volumes of dust that some of the European countries have actually had to legislate against its use except by the introduction of expensive dust collectors, to save the working people from being injured by breathing the atmosphere. In the Godavery delta the practice is at its best, also in Gopaulporte and Bengal, and if they could be studied and introduced to the rest of India, then we should have qualities of Hemp of greater uniformity, and a much higher price would be obtained for the product. In Jubblepore they grow a fine class of fibre; sometimes it is prepared in fresh water and is free from dust, but at times it also is prepared in muddy water and the fibre is deteriorated and weighted with dust in consequence.

"Owing to the scarcity of European Hemps during the last season, the demand for Indian fibres has been very great and the prices have gone up to a figure unheard of in the history of the trade. All this should encourage the native grower to enlarge the production and to improve his methods.

Customs.

The Customs Circular No. IV of 1912 issued by the Government of India states that, "In exercise of the power conferred by section 9 of the Indian Tariff Act 1894 (VIII of 1894) the Governor General in Council is pleased to cancel the notifications of the Government of India imposing under sections 8A and 8B of the said Act, additional and special import duties on Sugar produced in or exported from the Argentine Republic."

Notes and Comments by the Scientific Officer.

159. *Smoked or Unsmoked Rubber.*—In January last, while in Madras, I had the pleasure of meeting Mr. T J. H. Schmitz, a representative of the Firm of Messrs. Kaltenbach and Schmitz, big importing Agents in London. Mr. Schmitz was on a trip round the world combining business and pleasure and finding that his firm was more or less interested in Rubber. I had a long conversation with him on the subject and asked him, among other things, about the market values and prospects of Smoked as compared with Unsmoked Hevea Rubber. He kindly promised to get me some information on the subject on his return home. That promise was redeemed last mail by an interesting letter from Messrs. Kaltenbach and Schmitz in the course of which they say, that the bulk of plantation Hevea Rubber "is being made into Smoked Sheet, which, as a rule, is the most satisfactory, although carefully prepared. Unsmoked Crepe is always very saleable, but at present" (the letter is dated 27th June.) "There is not so ready a sale for Smoked Crepe as for Unsmoked, although there is very little doubt that it will come more into favour later on; up to now it is not tenderable under Market Contracts, but it is sure to be admitted later, when supplies become larger and more regular."

The Firm have kindly sent me some small samples of Smoked Sheet and good average Unsmoked Crepe, which were valued on the day of writing at 4/8½ per lb. and 4/10 per lb. respectively. These samples will be on view for the benefit of planters at the Exhibition to be held as usual in connection with the forthcoming Annual Meeting of the U. P. A. S. I.

It will be interesting to compare these samples and their prices with the estate samples at the Exhibition, and they may serve as a guide to planters of the kind of Rubber which finds favour in the London market.

The same firm inform me that the auctions of 2nd July contained 575 tons of Eastern Plantation Rubber. There was a good demand at the opening, and prices generally are fully up to the average of last auctions, except for 1st Latex which is selling at 4/10½*d.*

Hard Fine Pará 4/8½*d.* to 4/9*d.*, Soft Fine 4/2½*d.*

So far prices are:—

SHEET.—	Fair to Fine Smoked ...	4/8¾*d.* to 4/9¾*d.*
	Fair Unsmoked ...	4/8¾*d.*
	Damp, Mouldy & Stuck ...	4/5*d.* to 4/8*d.*
CREPE.—	Thick, Dull to Fine ...	4/9½*d.* to 4/11¼*d.*
	Dull Palish to Pale ...	4/9¾*d.* to 4/10½*d.*
	Good & Light Brown ...	4/5*d.* to 4/9¼*d.*
	Dark & Black ...	4/- to 4/5*d.*
	Black, Soft, pressed ...	3/5*d.* to 3/10*d.*
	Dark Smoked	4/4½*d.*
SCRAP.—	Fair	3/6*d.* to 3/7½*d.*
	Mixed & Inferior	2/9*d.* to 3/4½*d.*

RUDOLPH D. ANSTEAD,

Planting Expert.

CORRESPONDENCE.

Lime in Heavy Soils.

Sir,—In continuation of the letters which have appeared in the *Chronicle* on the above subject a correspondent writes to me asking:—

(1) What kind of soils may be considered heavy ?

(2) What period may be considered as quickly in the statement, "it acts quickly in liberating plant food ?"

(3) Whether Lime is better applied on the surface of the soil and held over, or forked in to a depth of six or eight inches ?

The following Notes on these questions may be of general interest:—

(1.) The terms 'heavy' and light as applied to soils are unfortunately chosen since they do not refer to the weight of the soil but rather to the ease with which it is worked and its resistance to the passage of a plough. Clay soils are heavy and sandy soils are light. The boundary line between light and heavy soils is an arbitrary one but a soil containing more than 25% of particles with a diameter less than one five thousandth of an inch are usually classed as clays, while soils containing from 15 to 25% of such particles are called clay loams and are heavy. A soil which is sticky when wet and which dries hard and cracks will usually benefit from an application of lime.

(2.) All times are comparative, and the time taken to liberate plant food depends upon many conditions among which climate is a most important one. Perhaps three months may be said to be 'quickly.' The point is that organic matter in the soil becomes more rapidly available in the presence of lime than in its absence.

(3.) The lime should be applied as slaked lime and should be spread as evenly as possible on the land and immediately worked into the top two or three inches, or covered over with a mulch of leaves. It is important that the lime should be thoroughly mixed with the soil, and it should never be applied and dug in.

RUDOLPH D. ANSTEAD, *Planting Expert.*

RECRUITING PROSPECTS.

Mr. C. Ryan, who has been acting as Ceylon Labour Commissioner in India until a permanent appointment, says the *Ceylon Observer*, returned to Ceylon yesterday *via* Tuticorin, and has taken up his quarters at the G. O. H. In conversation with an *Observer* representative there this afternoon he stated that the recruiting prospects in Kudappah and Salem are distinctly good, owing to shortage of foodstuffs. Kudappah is in the Telugu district, and the coolies there are most suitable for the lowcountry in Ceylon. If recruited for the lowcountry, they would be able to free the existing lowcountry labour for upcountry districts. Mr. Ryan also stated that he had been informed that the prospects in Malabar were also good. He pays a high tribute to the courtesy and kindness of the higher officials of the South Indian Railway, and the civility of the minor officials.

Referring to the Coast Agency Committee he said this was a most excellent institution, and every Ceylon planter should join the scheme. It had done good work in the past, and under good guidance was going to do much better in the future.

DISTRICT PLANTERS' ASSOCIATIONS.

Nilgiri Planters' Association.

At a General Meeting of the Nilgiri Planters' Association held at the Armoury, Ootacamund, on Thursday, the 18th July, 1912.

PRESENT.—Messrs. E. F. Barber, in the Chair; J. S. Nicolls, Honorary Secretary; W. Rhodes James, J. H. Wapshare, E. Hardy, J. Harding Pascoe, C. H. Brock, R. N. C. Groves, A. S. Dandison, C. Gray, A. K. W. Downing, L. L. Porter, G. W. Fulcher, B. Von Dulong. *Present by Proxy*:—Mr. J. B. Vernede, and Mr. W. C. Deane. *Visitors*:—Mr. E. H. Jones, Deputy Superintendent of Police, and Mr. T. C. Manders.

No. 30. *Proceedings of last Meeting* were read and confirmed.

No. 31, *Rules.*—These were passed and confirmed. The Honorary Secretary was instructed to have them printed and circulated amongst members.

No. 32. *Rule 20.*—Mr. Nicholson's communication recorded.

The Honorary Secretary was instructed to write to Mr. Nicholson on the subject.

No. 33. Read U. P. A. S. I. circulars.

No. 34. *Mr. Ormerod's resignation.*—Read the Chairman, U. P. A. S. I's. letter and Honorary Secretary's replies which were confirmed.

Delegates to the U. P. A. S. I, were given a freehand as regards voting on matters referred to in Mr. Abbott's letter of 25th May, 1912.

No. 35. *U. P. A. S. I. Draft Agenda.*—List of subjects were considered, special instructions being given to Delegates to oppose "The Green Tea Çess Bonus," to support registration whether voluntary or compulsory, and *Planters' Chronicle* being kept as a weekly edition, all other subjects being left to the decision of the Delegates.

No. 36. *Experimental Plot.*—Read correspondence, the Honorary Secretary being instructed to write and thank the Collector stating the limit of our requirements.

No. 37. *Act I of 1903.*—In reference to No. 25 of meeting held on 30th May, 1912, Correspondence recorded. The matter is being considered and a reply will be sent as soon as possible.

No. 38. *Non-Service of Warrants.*—In reference to No. 28 of meeting held on 30th May 1912. Correspondence read and recorded, the Honorary Secretary being instructed to write to the Inspector-General *re* D. I. G.'s report.

No. 39. *Railway Freight.*—No further progress was recorded.

The following resolution was proposed by Mr. L. L. Porter and seconded by Mr. A. S. Dandison :—"That the S.I. Railway would consider the question of reducing the rate by passenger train on tea seed imported into S. India and whether they could see their way to approach other railways concerned with a view to their also granting a reduction. Tea seed being a perishable article it is important that it should not be delayed in transit as must occur if it is sent by Goods Train."

No. 40. *Roads.*—This was discussed at length, further discussion being postponed till next meeting.

No. 41. *Cattle Permits.*—The following resolution was proposed by Mr. E. Hardy and seconded by Mr. J. H. Wapshare:—"That the Honorary Secretary be instructed to write to the District Forest Officer requesting that a representative of the Forest Department be sent out on or about the 20th July in each year to Naduvattam to issue cattle grazing permits and that owners and managers of estates in the Naduvattam District be given previous intimation."

No. 42. *New Member.*—Mr. J. B. Vernede was elected.

Votes of thanks to the Chair and O. C. Nilgiri Volunteers for use of the room terminated the proceedings.

(Signed) E. F. BARBER.
Chairman.

(„) J. S. NICOLLS.
Hony. Secretary.

Papers on Table.—G. O. No. 866, dated 31st May 1912. G. O. No. 1914, dated 28th June 1912. The Memoirs of the Department of Agriculture for May 1912. Prospectus of the Mysore Dasara Industrial and Agricultural Exhibition 1912.

No. 45—T. C. Indian Tea Cess Committee report for the year 1911-12 by Commissioner in Europe.

Prof. R. Newstead, the greatest authority on scale insects of the Liverpool School of Tropical Medicine, showed a fine collection of injurious scale insects. I noted that this fine collection was closely scrutinised by visitors. From Dr. Berger of the Agricultural Experimental Station, Florida, U. S. A. came an exhibit of various scale insects with the minute fungi which attack them in that country and in other tropical and sub-tropical countries when the damp season comes on. Were it not for these minute fungi the scale insect would destroy citrus plants altogether in Florida, and the coffee plant in India, and rubber plants in other parts of the world would have a poor time of it were it not for these minute fungi, which regularly attack the scale as soon as the damp or rainy season comes along. I have had sent me from India coffee leaves with the scale insects surrounded by a sort of halo or fringe, which under the microscope was seen to be exceedingly minute fungus. Among the exhibits I noted a red-headed scale fungus, *Sphaerostible conophila.* The white fly of the citrus plant was also shown (*Aleurodes nubifers*) with a yellow fungus attacking it named *Aschersonia flavocitrina.* There was a turbinate scale parasited by *Aschersonia turbinata*, and the San Jose scale parasited by *Myriangium.* This was an exceedingly interesting exhibit, as it showed how nature strikes a balance in these matters. It would be interesting to know whether this *Myriangium* could be made to grow in the colder districts of America and Canada, where San Jose scale has became such a nuisance. It may be, however, that this fungus will only grow in very moist atmospheres, as I know my friends in India say that the scale fungus will not begin to grow and destroy the scale until the moist, rainy season comes on.—*Fruit Grower and Market Gardener.*

PEPPER.

The *Scientific Report of the Taliparamba Agricultural Station* for 1911-12 by H. Southern, the Acting Deputy Director of Agriculture, Southern Division, has just come to hand. It contains the following interesting account of the experiments which are being conducted with pepper at that station and the results obtained. The report on these experiments for last year, 1910-11 was reproduced in the *Planters' Chronicle*, Vol. VI, p. 492.

"Though flowering was late this year the setting of berries was good, and taking into consideration last year's comparatively low yield and the improved condition of the garden generally, a record yield was expected; the advent of the north-west monsoon, however, put a stop to this, as the heavy rains and strong winds caused much shedding of spikes. About the end of October, 'Pollu' disease made its appearance and spread very rapidly, the conditions evidently favouring it. Block III where the natural drainage is bad, was as usual badly attacked and to say that 25 per cent. of the crop was lost is not over-estimating the damage done by this pest in this part of the garden. The pepper gardens in the neighbourhood of the farm also suffered severely and it is to be hoped that now an Entomologist has been appointed to this Presidency, some means of fighting this disease will be discovered.

"Table II shows the total yield of green pepper in Madras measures for the last 7 years and from this it will be seen that this year's yield of 3,654 Madras measures is the highest on record, with the exception of the 1910 crop, which is a satisfactory result considering the adverse season.

"*Experimental Plots.*—Table III shows the yields of the several plots under experimental treatment and the results, as a whole, bear out the conclusions drawn last year. Now that the young vines are beginning to bear, the plantwar yields are naturally lower.

"*Lime and Leaf-mould.*—This plot shows a more marked improvement than any other and the healthy appearance of the foliage even in the hot weather is very noticeable. The yields which have increased every year since the experiment was started as follows:—

1907	5·75	Madras measures.
1908	28·5	do.
1909	36·00	do.
1910	78·00	do.
1911	91·00	do.
1912	113·5	do.

"*Gingelly oil-cake.*—The behaviour of this plot has been very erratic and it is impossible at present to draw any conclusions. From the alternately high and low yields one might conclude that this plot contained chiefly *Kalluvalli* vines, but as this is not the case the reason may be due to an exhaustive re-action produced by the manure. The yields are as follows:—

1907	1·75	Madras measures.
1908	13·5	do.
1909	27·00	do.
1910	50·25	do.
1911	19·625	do.
1912	49·75	do.

"The following plots continue to show steady improvement as will be seen from the yields which are as follows in Madras measures:—

Year.		Fish manure plot.	Cattle manure plot.	Leaf-mould plot.
1907	...	37'75	2'75	7'00
1908	...	72'25	32'5	52'5
1909	...	86'25	35'5	21'25
1910	...	156'5	83'25	73'00
1911	...	98'5	43'625	28'75
1912	...	103'25	71'00	47'00

"*The moulding and leaf-mulch plots.*—The condition of the vines in these plots is very much improved and the yields would have been much higher but for the severity of 'Pollu' attack.

"*Green manure plots,*—No very marked improvement has been noticed in any of these plots and the growth of green manure crops generally is not very satisfactory. The sun-hemp (*Crotolaria juncea,*) *Cassia tora*, and Kolingi (*Tephrosia purpurea*) plots failed: evidently these crops are not suited to shady situations. The Ponnani cowgram, horse gram and ground-nut plots made a fair growth and the vines in the latter plot seem to show some improvement which may, however, be due to the extra digging which the ground receives at sowing time.

"*Standards.*—Thekkam Karayan (*Garuga pinnata*, Roxb) and Ambayam (*Spondias mangifera*, Willd) have proved themselves superior as standards to Muruku (*Erithrina indica*), especially in old gardens where there is usually heavy top shade; they are consequently being substituted for the latter as the old standards die."

RUBBER COURSES IN LONDON.

A course dealing with the chemistry and analysis of rubber has been established at the Northern Polytechinc Institute, Holloway, London, Mr. Frederick Kaye being in charge with a total attendance of 38.

The students may be divided into three groops:—

(*a*) Young men intending to go to Ceylon or Malaya, to be attached to plantations.

(*b*) Men engaged in the London rubber market, attached either to brokers' offices, or to those of plantation companies.

(*c*) Men engaged in the manufacture of rubber, or in London rubber warehouses.

The first part of the course was devoted to the study of crude rubber production, as well as to its analysis and the estimation of the commercial value of different rubbers. Attention is now being directed to methods of vulcanization, in addition to the physical and chemical investigation of vulcanized articles.

Next year the students will, it is expected, be able to devote themselves to more thoroughly analytical work, as the laboratory installation will then be more complete.

It is a distinct encouragement to the cause of rubber research to find the subject so successfully taken up in England.—*The India Rubber World.*

RUBBER.

Where Rubber Comes From.

[*Concluded.*]

CLASSIFICATION ACCORDING TO STRUCTURE.

Another useful system of classification is that according to the part of the plant which yields the rubber. Under this heading there are three groups: (1) stem, (2) root, and (3) the whole plant. Among stem rubbers one can include arborescent forms such as Hevea and Manihot, and climbers as Landolphia and Parameria. Among the root rubber we have Clitandra, Carpodinus, and many other African genera, from which rubber is obtained by macerating the bulbous roots and extracting with water. The whole plant may yield rubber, as in the case of the guayule shrub where the whole structure is uprooted and subjected to maceration. Perhaps one might also include Palaquium, since it gives gutta not only from the stems, but also from its leaves.

TRADE NAMES AND BOTANICAL ORIGIN.

It is singular that there are many instances of trade names being associated with the produce from one species only. For instance, fine hard Pará we know always comes from Hevea brasiliensis; Rambong from Ficus elastica; Ceará from Manihot Glaziovii, etc., etc. On the other hand there are many instances of trade names being applied to produce derived from quite a number of species, and in the last category we find the same species may provide different named rubbers in different parts of the world. The best example of the last group is probably to be found in the produce from Landolphia Heudelotii, this species providing Soudan niggers, Gambia balls, Massai, and many other grades known as niggers, twists and flats.

At the present time it is admitted that there is a very wide variation in the characteristics of rubber from different plants distributed throughout the Tropical zone in both Hemispheres, but it must also be admitted that there are indications of a change which is likely to come over the character of our supplies. We find that the climbing forms which hitherto have given us such large crops in Tropical Africa are showing a reduction in quantity, and that silk rubber from Uganda, Ceará rubber from East Africa, and Hevea from West Africa, are gradually taking up a definite position in supplies from that part of the world. In the Middle East Rambong rubber, known as such an important supply in years gone by, is undoutedly dwindling. Even Palaquium as a source of gutta is now almost neglected. In both these areas—Tropical America and the Middle East—there is a tendency for rubber from tree forms to gain a premier position, and in both areas the same type—plantation Pará—appears to be leading easily as a grade on the market. In Tropical America itself, it is true that the old supplies, which it must be remembered were mainly from trees, are being maintained, but even in that area one can see that many efforts are being made to turn out a purer product, and one which will show much more constancy in physical and chemical characteristics. Taking the trend of events over the whole of these areas, one can foresee that within a few years the rubber from Hevea brasiliensis will be the predominant type. This fact must not be lost sight of by those now depending upon other sources, for the simple reason that the produce from Hevea brasiliensis is unquestionably the standard in manufacture, and it is, therefore, one which will be most favoured when supplies come forth in large quantity and prices decline to a very low level.

Following out our remarks on the subject of plants yielding caoutchouc, we are led to an examination of the actual structures wherein latex accumulates. It must be realized that in almost every country there are numerous plants which yield latex. But all such plants do not necessarily supply rubber. The spurges, sow-thistles, lobelias, and many other common plants met with in this country yield enormous quantities of latex; similarly in the tropics species of Fuphorbia, Carissa, Plumeria and others squirt out volumes of white or yellowish latex when cut. The percentage of caoutchouc in most of these plants is, however, so small as to render their exploitation unprofitable.

CAOUTCHOUC PERCENTAGE OF SPECIFIC VALUE.

Another point of importance is that when one considers species of the same genus it frequently transpires that though they all contain latex having caoutchouc in perceptible quantities, only some of them possess the requisite percentage of caoutchouc from the commercial stand-point. For instance, the genus Funtumia includes two species, F. africana and F. elastica, containing latex; but rubber cannot be extracted in paying quantities from the former, though the latter has long been known, as the source of Lagos silk rubber. In this case, therefore, one can identify the species mentioned, F. elastica always giving a high percentage of caoutchouc, but F. africana never. In a similar, though less definite, way one can associate a certain range in chemical composition of latices from species of Palaquium—one of which yields guttapercha—or even of Hevea, Manihot and Castilloa.

A suggestion was at one time made that the ash constituents were also an indication of the botanical origin, lime being characteristic of Hevea, magnesia of Manihot, and iron of certain African rubbers.

DIFFERENCES OF STRUCTURE.

The actual vessels or channels wherein this variable mixture is contained exhibit features of an equally variable nature. Yet it is upon their anatomy and distribution that most schemes of tapping, not only in point of distance between tapping lines and frequence of tapping, but also in the kind of implement used, have been based. The most frequent type on rubber plantations is that termed the "articulated" form of latex vessel. It is to be found in Hevea and Manihot. In this group the latex vessels are formed by the breaking down of the walls of the cells of the bark in such a manner as to lead to the production of an irregular channel with the remnants of the original cell walls as its sides. Out of a series of regular bark cells a definite channel is ultimately formed, which subsequently becomes charged with latex. This decomposition is taking place every hour in every Hevea tree on plantations so long as the bark is in a living state. If the tree is so badly tapped as to prevent the regular production of bark, then the source of future latex tubes, and therefore of rubber, is gone.

The second type of latex vessel, the "non-articulated," is to be found in Ficus and Castilloa. Here there is no decomposition necessary. In the embryo of each Ficus or Castilloa tree the latex vessel consists of a tube which begins, at an early period, to throw out branches in all directions, which ramify throughout the young plant. This non-articulated system pushes its way between the existing cells of the bark without effecting any decomposition. It is nothing more than a much-branched tube, with numerous growing points.

In the third type, exemplified in Palaquium, the latex is accumulated in local groups of bark cells which are not connected with one another.

INFLUENCE OF TYPE ON DISTANCE.

The foregoing statement will indicate that the most open communicative type is the non-articulated. An incision of the same size drains a far greater length of latex tubing in Ficus elastica than in the disconnected articulated type of Hevea brasiliensis. Therefore the distance between the tapping lines must be widely different, and also the interval of rest between successive tappings. The greater the area drained by a given incision the longer the interval that must be allowed in tapping operations. In the Palaquium type the disconnected groups of latex cells must be tapped on an entirely different plan in order to get the latex from each group of cells the tapping lines must be very close to one another, in fact all over the surface of the tree.

DECOMPOSITION SERIES BEST.

Where incision only is practised it is clear that the distance between the tapping lines is determined by the type of latex vessel; where, however, paring is regularly adopted, other factors come into consideration, the chief being the process of formation of the latex vessels. In the articulated type of Hevea and Manihot the decomposition of cell walls is going on at all times: so long as new bark is produced new lactifers will form. This is by no means the case in the other series, where once the latex tubes are drained an interval must be allowed in which the same structures originally tapped can become refilled with latex. It would thus appear that the salvation of Hevea brasiliensis depends entirely on this process of decomposition being continued throughout the life of the plant. It is remarkable that at the present time only those plants which have this type of latex vessel are proving successful under cultivation. It would, therefore, be advisable to bear this point in mind whenever any " new species " of rubber yielding plants is placed before the planting community.

Pink Disease in Java.

" Pink disease," caused by *Corticium salmonicolor* B. and Br. (*Corticium Javanicum* Zimm.), has long been known in Java under the native name of " Djamoer-oepas," and has engaged the attention of the Scientific Department from time to time during the last twenty years. Zimmermann gave a full description of the disease, particularly as it affects coffee, while Zehntner, Wurth, and Bernard have dealt with it on other cultivated products. Now appears another paper on the same disease, chiefly in its relation to cinchona, by Dr. A. Rant, the Botanist of the Java cinchona plantations.

Dr. Rant enumerates 141 species of wild and cultivated plants which are known to be attacked by this disease. To this list another can be added, for the fungus has recently been found on Camphor (*Cinnamomum camphora*) in Ceylon, a host which is not given by Rant. It is interesting to note that it occurs on Cacao in Java, while there is no record of pink disease on that plant in Ceylon.

Dr. Rant's paper is an excellent contribution which clears up many doubtful points and rounds off in a masterly manner the work of previous investigators. Seeing that the fungus has been recorded on so many defferent plants, he set himself the task of discovering whether all these fungi were really the same species, and, if so, whether there existed any " biologic" forms. In other groups of fungi. *e.g.*, the *Uredineoe* and *Erysiphaceae*, it has been proved that fungi which are morphologically indistinguishable yet differ in their ability to attack closely related plants. Marshall Ward, for example, proved in the case of *Puccinia dispersa*, which was supposed to attack all species of *Bromus*, that the fungus on *Bromus sterilis* would not infect *Bromus mollis*, while that on *Bromus mollis* could only rarely attack *Bromus sterilis* ; and similar cases have been demonstrated by Eriksson. Again Marchal pointed out that the *conidia* of *Erysiphe graminis* on wheat are not able to infect common barley, oats, or rye; and in this group further instances of this specialised parasitism have been discovered by Salmon. These discoveries have led to the conception of "biologic" species, *i.e.*, species which are morphologically exactly alike but are not able to infect the same plants. The application of this to the present case is obvious. The fungus which causes Pink disease on Hevea is indistinguishable from that on tea, or orange; but if these three proved to be biologic species infection of tea by the fungus on Hevea would be impossible. Unfortunately, Dr. Rant has proved the contrary: with one possible exception, his experiments have shown that biologic species do not exist in *Corticium salmonicolor*, or, in other words, that the fungus on any of its host plants may transfer itself to any other. To put it briefly, Dr. Rant set out to show, if possible, that the disease was not so bad as it appeared, but he has been forced to conclude that it is all that was claimed for it, and indeed rather worse.

Corticium salmonicolor was known to occur on affected trees in three forms. The typical form is a thin, continuous, pink sheet which becomes cracked in all directions and changes to a yellowish tint when old. In very damp situations, it often takes another form, running over the surface of the cortex in a thin felt of long silky hyphae, usually white or silvery. The third form consists of minute pink cushions, usually elongated vertically, in small cracks in the bark: in Ceylon, the first formation of these cracks, before the pink cushions have appeared, has been styled the "measles" stage. Dr. Rant has, by suitable cultivations, provided the scientific proof that these three forms are, as was supposed, stages of *Corticium salmonicolor:* and moreover he has proved that another fungus, which was originally found on Coffee in Malaya and named *Necator decretus* by Massee, is really a fourth form of the same *Corticium.* The latter form has not yet been recorded from Ceylon.

One important new fact demonstrated by Dr. Rant is the existence of the mycelium in the wood of the affected plant. By suitable methods, he was able to develop the fungus in pure culture from the mycelium in the wood and to reproduce the disease by inoculations from the pure culture. It follows from that, that merely scraping off diseased bark is insufficient to eradicate the fungus.

In the matter of treatment there is little news to be recorded. The old method of cutting off and burning the diseased parts is recommended, with the caution that burying is insufficient. Treatment of *already diseased trees* with fungicides is deprecated, since they cannot kill the fungus in the wood. Carbolineum proved ineffective on Cinchona, but its effect on tea appeared to be somewhat better.

It is surprising to find that Dr. Rant makes no reference to the successful experiments in preventing the attack of pink disease on Hevea in South India by the use of Bordeaux mixture. The results have proved most satisfactory; and, seeing that they have been reported on several occasions in the *Planters' Chronicle*, some knowledge of them should by this time have reached Java. Fortunately, the disease has not been serious enough in Ceylon to warrant the adoption of that method of prevention.—*T. Petch in the Tropical Agriculturalist.*

The Planters' Chronicle.

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THE U. P. A. S. I.

(INCORPORATED.)

Nineteenth Annual Meeting.

The Nineteenth Annual Meeting opened at Bangalore on 12th August, 1912, the following being present:—

CHAIRMAN	MR. C. E. ABBOTT.
SCIENTIFIC OFFICER	MR. R. D. ANSTEAD.
SCIENTIFIC ASSISTANT FOR MYSORE ...	MR. G. N. FRATTINI.

Delegates.

Anamalais	MR. J. H. ROBINSON. MR. C. MARSH.
Bababudin	MR. N. G. B. KIRWAN. MR. G. R. OLIVER.
Central Travancore	MR. H. C. WESTAWAY.
Coorg	MR. J. GRAHAM. MR. E. L. MAHON. MR. W. M. BALL.
Kanan Devan	MR. E. A. HUGHES.
Malabar Coast	MR. H. C. PLOWDEN.
Mundakayam	MR. G. DANVERS DAVY.
Nilgiris	MR. E. F. BARBER. MR. C. H. BROCK. MR. J. S. NICOLLS.
North Mysore	MR. W. H. REED.
South Mysore	MR. M. J. WOODBRIDGE. MR. F. M. HAMILTON.
Shevaroys	MR. C. DICKINS.
South Travancore	——
Wynaad	MR. C. E. ABBOTT. MR. J. S. NICOLLS.

Visitors.

Sir Hugh Daly, K.C.S.I.
Mr. G. H. Krumbeigel.
Mr. L. King-Church.
Mr. G. W. Denne.
Mr. H. Cardozo.
Mr. W. Rankin.
Mr. C. G. Maclean.
Mr. L. G. Meldrum,

and Several Ladies.

AGENDA PAPER.

MONDAY, AUGUST 12.

1. Annual Report and Statement of Accounts.
2. Chairman's Address.
3. Work of the Planting Member.
4. Scientific Officer's Report.
5. Weights and Measures.
6. Roads and Communications
    - (a) Railways.
7. Legislation—
    - (a) Prevention of Thefts of Tea, Rubber, (Travancore) &c.

TUESDAY MORNING, AUGUST 13TH.

8. Finance.
9. Planters' Benevolent Fund.
10. The *Planters' Chronicle.*
11. Office and Establishment.
12. Scientific Department—
    - (a) Laboratory.
    - (b) Library.
    - (c) Staff.
    - (d) Assistants
    - (e) Bulletins
    - (f) Contingencies
    - (g) Programme for 1912—13.

TUESDAY AFTERNOON.

13. Coffee—
    - (a) Experiments
    - (b) Hybridisation.
    - (c) Bees
    - (d) Quality and Curing
    - (e) Markets
    - (f) Adulteration.

WEDNESDAY MORNING, AUGUST 14TH.

14. Agricultural Matters—
    - (a) Tea Cess.
    - (b) Pests and Diseases.
    - (c) Fertilisers.
    - (d) Export Duty on Bones.
    - (e) Cultivation.
    - (f) Products.
15. Rubber—
    - (a) The International Rubber Exhibition, 1911.

WEDNESDAY AFTERNOON.

16. Duties—
    - (a) Proposed Coffee Cess and Popularisation Scheme.
17. Tea—
    - (a) Markets.
    - (b) Green.
18. Labour—
    - (a) Recruiting and Emigration.
    - (b) Enticement of Advanced Labour to emigrate.
    - (c) Non Service of Warrants.

THURSDAY, AUGUST 15TH.

19. Alteration of Rules.
20. Election of Office-bearers for 1912-13.

The Chairman's Opening Address and the Annual Reports of the Secretary and the Scientific Officer follow :—

The Annual Report of the Secretary, 1911-12.

GENTLEMEN,—Having only assumed office as your Secretary at the eleventh hour, I must claim your kind indulgence for its shortcomings and omissions.

I regret that I have to open my report by having to record the death of Mr. Trevor Roper, whose loss has occasioned deep regret amongst a wide circle of friends.

A number of invitations have been sent out to those interested in our various products, the majority of which have been accepted and we have to welcome many visitors.

A vacancy having occasioned on the Indian Tea Cess Committee on account of Mr. Romilly having gone to England, Mr. Carson Parker has been elected to fill it.

A portrait of Mr. Ackworth, who at various times was your Chairman and Planting member and occupied those positions with conspicuous ability has been added to our gallery of those who have filled those positions.

I may mention that a small exhibition of products by members of this Association and others, including some coffee pulping machinery is being held at the Office of the U. P. A. S. I. This will be open from the morning of the 12th August.

The *Planters Chronicle* has, since the beginning of this month, become the property of the Association and will continue to be the chief medium to bring matters of interest to the planting community to the individual planters and it is to be hoped it will continue to receive the support of every member.

THE SCIENTIFIC OFFICER.—The personal strain of the past two years on this office, has been relieved to a certain extent by the advent of Mr. Frattini, Assistant Scientific Officer, who has taken up his duties in Mysore and this strain will be further decreased when Mr. Jonas, Assistant Scientific Officer, who has been engaged for Coorg, arrives, which will be about the middle of October. Those invaluable papers published in the *Chronicle* and of such interest to you all, will, I hope, be largely increased as Mr. Anstead finds more time at his disposal.

THE EXPERIMENTAL PLOT.—The Scientific Officer reports that work has commenced and is in progress on the plot of land granted by Government and Rs. 50 has been spent up to date leaving a balance of Rs. 265 and it will be necessary to call on the guarantors during the course of the year for subscriptions.

LABOUR.—During the past year printed and illustrated circulars in different vernaculars have been distributed with beneficial effect and has shown the would-be emigrant coolie that well paid and regular labour is to be found at his door, instead of severing himself for years from home ties, but members should remember that there is still much to be done, for besides Ceylon competing in the Labour market you have Assam recruiting at your very doors and paying very large advances per head. Members should not relax their efforts to stem the tide of emigration.

ROADS AND COMMUNICATIONS.—In Mysore considerable activity is being shown in the matter of railways. Mr. Bell, the well-known Railway expert has been appointed Consulting Engineer for Railways to the Government of Mysore and many surveys are being undertaken with a view to linking up the country with the main line. I especially bring this to the notice of the Coorg Association. Though the Arsikeri-Mangalore Railway, so long agitated for, does not at present appear feasible, the whole subject of railways in planting districts should constantly be kept before the Railway Board through this Association.

PEST ACT.—The Government of India nominated a Committee, of which your Scientific Officer, Mr. Anstead, had the honor to form one to enquire into this matter. The suggestion arrived at by this Committee are of a confidential nature and are under the consideration of the Government.

THE INTERNATIONAL RUBBER EXHIBITION.—The accounts have been closed. The total subscribed was Rs.5,060-13-5 of which Rs.3,499-12-4 was spent and the balance Rs.1,561-1-1 was returned to the subscribers in the proportion of 2 annas 4½ pies for each rupee originally received.

ACCOUNTS.—A new system of accounts has just been introduced which has simplified these; they have been audited and certified as correct; and I beg to lay them on the table but before concluding would draw your attention the comparisons of the estimates.

	Estimate 1911-12.		Actual.
Receipts	Rs.7,961 0 3	...	Rs.8,694 4 8
Disbursements	Rs.8,935 0 0	...	Rs.8,126 11 2

This shows a small profit of Rs.567-9-0.

The Chairman's Opening Address.

GENTLEMEN,—You have heard the Secretary's report on the working of the Association for last year read. It is shorter than usual partly because Mr. Norton has only just taken charge of the Secretary's Office and partly because this has fortunately been a year of quiet progress in planting matters.

FINANCE.—The first subject that ought to be dealt with at this Meeting is the Budget. It is usually postponed to the closing day, always, I think a bad plan. Last year the result of doing so was specially pernicious. Some members had left Bangalore, the remainder were tired out. After a long discussion we agreed to temporarily take the last of the "Reserve Fund" in order to increase the Secretary's salary and to invite District Associations who had not joined the scheme for providing Assistant Scientific Officers to raise their subscriptions for all purposes to 2 annas per acre. A Circular was issued in accordance with this resolution. I asked the Editor of the *Planters' Chronicle* to publish it and the replies received. He objected to do so. The consequence is that subscribers generally are in ignorance of what has been going on. It may be said shortly that though some 'Associations subscribed the extra money for a year, on condition that a full enquiry was held into U. P. A. S. I. Finance, others declined and some postponed the question. So throughout the year your Finance Committee, in addition to other worries, has been in ignorance of what money it had to work with. I need not go further into the question now.

PRODUCTS.—Our principal products have done well in the past year and will, I hope, continue to do so.

The price of coffee has been higher than for some years. that of rubber though below its highest, continues quite satisfactory to its growers as is witnessed by the extensions that are going on in South India and elsewhere. The market for Tea continues firm. A subject that has been brought before us for consideration this year is that of the unfair pushing of China Tea in the United Kingdom by advertisements animadverting on the deleterious qualities of the Indian and Ceylon product. Apparently the high price of the latter has led some traders to stock cheep China Tea, and, as their customers did not like it, they took up the line American dealers did in competing with the Indian Tea Cess Commissioner. The competition of the China article is not serious so far as only 14 million lbs. of China Tea went into consumption in the United Kingdom as against 257 million lbs. of India and Ceylon and 21 million lbs. of Java Tea.

The question of renewing the Tea Cess will come up for discussion, and the general feeling among planters appears to be in favour of going on paying it. Mr. Parker our representative on the Cess Committee, went near to converting that body to paying a bonus on the export of Green Tea.

We have to thank the Editor of the *Madras Mail* for publishing telegrams about the prices of Indian Tea in London throughout the year.

SCIENTIFIC DEPARTMENT.—This has been an important year for the Department as two Assistants have been appointed to help Mr. Anstead one by the Mysore Association and one by Coorg. Mr. Frattini has already taken up his work, and Mr. Jonas will be in India by the middle of October. We have to congratulate the Associations concerned on their enterprise. I was glad to see that the Kanan Devan Association has decided to join the Scientific Officer Fund, so now all the Associations belonging to the U. P. A. S. I. are subscribers.

Mr. Anstead has had a busy year: he will read you his own report. Personally. I have to thank him for a great deal of assistance given most ungrudgingly outside his own special work.

LABOUR DIFFICULTIES.—Conditions vary so much in different districts that it is not much use making general remarks drawn from experience in one of them.

Our Vice-Chairman, Mr. Martin, whose absence, we all regret, composed an advertisement showing that coolies could do just as well in South Indian Planting Districts, as they could by crossing the sea and that there was regular and well paid work to be obtained close to their own villages.

The draft advertisement was circulated to all associations and was finally adopted and printed by the U. P. A. S. I. which accepts the responsibility. I saw in the *Madras Mail* that one Ceylon Association appeared to object to something in this advertisement. Since then the Central Ceylon Association has instructed its Labour Commissioner to enquire into the matter. Should any communication be received from the Ceylon Planters' Association we can enquire what particular statement is objected to. I believe there is nothing in the publication that is not absolutely correct.

As I have said before, South Indian and Ceylon Planters have no quarrels: they have been recruiting very peaceably side by side for a number of years. What trouble there is has arisen from the fact that Ceylon planters who have moved further East wanted the same class of coolies that they had been accustomed to in the Island, and believed that a couple of districts in South India could afford an inexhaustible supply.

MILITARY PENSIONERS.—A letter has been received from Colonel Monck Mason, Paymaster of Pensioners at Fort Saint George, inviting us to employ Military Pensioners, both European and Native, on Estates.

Members of my own Association were willing to employ a certain number of ex-Sepoys on special works such as Factory watchmen, cart drivers, gardeners or assistant engine drivers on regular pay of from Rs. 10 to Rs.12 a month. We believed that the conditions in Wynaad were hardly suitable for European Pensioners. But I promised to bring the subject forward here as some Delegates might be able to employ European ex-soldiers in positions of trust. Colonel Monck Mason's letter can be seen by anyone interested.

GENERAL.—I think I have alluded to all the subjects that require special mention.

Mr. Ormerod's resignation came at an inconvenient time, and we will all regret losing the services of one who has been Secretary for so long and done excellent work for us in past years. I believe we have got a good man to succeed him.

Our Planting Member, the Hon'ble Mr. J. G. Hamilton, is unfortunately unable to be present having had to leave India on account of his health. We all hope that the change will completely set him up. The election for a representative of this Association in the Legislative Council takes place in November, and Mr. Hamilton suggested that we should get a candidate or candidates nominated at this Meeting: so I had a circular sent out asking you to be prepared to do so. The names put forward have to be ballotted for by District Planters' Associations.

When I was returning—thanks for the honour that was done me in electing me to be your Chairman for the second time—I urged those members of District Associations who objected to anything that was-done here, or to the line of policy in any particular instance not to stay at home and grumble, but to come here and explain their views. I have been told that the form of my remarks on the subject was somewhat crude and truculent. I said do not say you " won't come to Bangalore to hear that fool talk, come hear and tell him he is a fool."

It is difficult to be polished and elegant on the spur of the moment unless one has been brought up to it : but what I meant was plain enough. This Association has now been in existence for 18 years and has done a great deal of useful work for the community it represents. Its Founders had a far more difficult task to perform than those who started similar Central Associations in Ceylon and Malaya where planting districts are close together, and planters represent the principal industry of the Colony. Here we are in a minority scattered over half a continent. That our main interests are identical is proved, if proof were needed, by the continuous support the U. P. A. S. I. has received from District Associations. But there must be details in which our wants differ to some extent, and occasions on which the decisions come to here may appear even harmful to some individual planter. These Annual Meetings afford such men the opportunity of explaining their views to their fellow-planters and of discussing the subjects that interest them. It is a mistake to imagine, if anyone does imagine, that it is no use for a man whose opinions differ from the majority of delegates to come here. He will probably find supporters from the first. In any case he will be carefully listened to. He may even hear arguments that will modify his own views.

One remark that I made last year needs no qualification. I said I was sure that I should have the willing assistance of the Vice-Chairmen and Secretaries of District Associations. It has been rather a trying year and has involved a good deal more work than I expected. Without your constant assistance, Mr. Barber, and without the sympathy and confidence of all the Councillors I could not have carried on. I am very heartily grateful to all of you.

Annual Report of the Scientific Officer.

1ST JULY, 1911 TO 30TH JUNE, 1912.

MR. CHAIRMAN AND GENTLEMEN,

I have the honour to present to you my Third Annual Report as Planting Expert and Scientific Officer to the U. P. A. S. I. This report, as in former years, is only a summary of the work done during the year under review, and detailed discussion of pests, diseases, manures, &c., will be dealt with under their separate headings on the agenda paper.

OFFICE AND CORRESPONDENCE.

My office staff throughout the year has consisted of one writer and one peon, and the up-keep of this staff is met by a contribution from the Government of Madras.

The office work has again shown an increase during the year, the number of letters received being 710 as compared with 536 last year, and the number of letters written being 642 as compared with 534 last year. The large majority of the letters received continue to be from planters asking for advice about manuring, cultivation, pests, &c., &c., and they have all received my personal attention, so that correspondence continues to take up a large portion of my time when I am at head-quarters. With so large a district to work over much must necessarily be done by correspondence, and I venture to think that the increase in this section of the work is an indication that your Scientific Department is becoming an increasingly useful bureau of information.

THE PLANTERS' CHRONICLE.

I have contributed regularly to the pages of the *Planters' Chronicle* which has been issued as a weekly throughout the year, and I have written for it 35 papers and 45 notes as well as miscellaneous items.

At the last Annual Meeting it was decided that Bulletins should be published from time to time by the Editor of the *Planters' Chronicle*. In accordance with this one Bulletin dealing with the subject of 'Pink' disease of Hevea Rubber and Bordeaux Mixture' has been published. Changes in the Secretaryship have prevented the publication of any further Bulletins but it is hoped to get out several more during the coming year.

HERBARIUM AND COLLECTIONS.

Little work has been done on these during the year for want of time. The collection of Leguminous Plants suitable for green dressings and cover crops has been added to to some extent, and about fifty sheets have been added to the general collection in the herbarium. My thanks are again due to Dr. Barber, the Economic Botanist to the Government of Madras, stationed at Coimbatore, for his kindness in checking determinations and naming plants from herbarium specimens sent to him.

A miscellaneous collection of insects was made during the year and these were handed over to the Imperial Entomologist for naming, and they will find a place in the collections at Pusa and Coimbatore.

TOURS.

During the period under review I have visited the following districts in the order named :—Shevaroys, Coorg, Anamalais, North Mysore, and Coorg for the second time to inspect a special disease. I had the pleasure of being accompanied on the Anamalai tour by the Imperial Entomologist who was collecting insects.

I also attended the Mysore Dasara Industrial and Agricultural Exhibition held at Mysore City in October, and arranged, and took charge of, the U. P. A. special Exhibit. A very good show, especially of coffee and rubber, was got together and displayed in a separate building. The exhibit of rubber was probably the most complete and extensive which has ever been shown in India, and it elicited a great deal of interest and attention. A refreshment room was run in connection with our exhibition at which South India Tea, and Mysore and Coorg Coffee were supplied and sold, and our thanks are due to Messrs. Spencer & Co. for the aid they afforded us in this connection. A Gold Medal was awarded us for our Exhibit which may be said to have been an unqualified success, but I am doubtful whether it paid from a business point of view, or whether it is worth while to repeat the experiment for the present. The expenses of the Exhibition were met by a special grant from the available Rubber Exhibition Funds.

In November I went to Pusa to attend a Meeting of a Special Committee appointed to consider the question of the introduction of insect pests and diseases through the importation of foreign plants of which I had the honour to be made a member.

This question bears upon the subject of a Pest Act and is a most important one, and very closely affects the welfare of the planters of Southern India. The Committee went into the matter in great detail and made certain recommendations to the Government of India which are at present of a confidential nature.

After the Committee Meetings had finished I stayed at Pusa, by special invitation, to attend the Meeting of the Board of Agriculture.

These tours have necessitated my being absent from Head-quarters for 76 days during the year, and travelling a distance of 6080 miles by rail and 757 miles by road.

During my tours in the planting districts I was able on several occasions to attend meetings of the District Planters' Associations and to deliver several lectures. I should like to take this opportunity of expressing my thanks to the Honorary Secretaries of the District Planters' Associations concerned for the arrangements they made for me, and to all those who have so generously afforded me hospitality and transport facilities, and helped me to make my tours easy and successful.

It will be seen that during the period under review I have toured less than in past years and so have been able to devote more time to research work in the laboratory. This, I think, is as it should be, as I have been over most of the districts under the U. P. A. S. I., and I am now familiar with their varying conditions, and little more can be done than has already been done by visiting estates.

As pointed out in my report last year, I have given all the advice which it is possible for me to give from a casual inspection of estates, and it is impossible for me to do more when my visits are confined to a few weeks in each district, much of the time being taken up in actual moving from place to place. I can now give just as good advice from my office as I could on the estate upon points which do not need field study. To see the same disease, or pest, over and over again on different estates and in different districts year after year is of no use. In such cases study on the spot by a man living and working in the district is what is needed, and it is far better that I should be allowed to stop at head-quarters and direct such a man, and devote myself to some special problems of general interest such as soils, and manures, &c., which can be worked out in the laboratory.

I would again suggest that I should be allowed to work at head-quarters for the greater part of the year, and that my touring be confined to one or two districts only each year so that I may tour at leisure, and spend more time in the districts visited.

SCIENTIFIC ASSISTANTS.

Two districts, Mysore and Coorg, have shown themselves in agreement with these views by appointing Assistants to reside in their districts and carry out work in them under my direction.

Mr. G. N. Frattini was appointed Scientific Assistant for Mysore, and arrived in Bangalore on 6th May 1912, and after spending a few days at head-quarters he went to North Mysore and began work.

Mr. L. G. Jonas has been appointed Scientific Assistant for Coorg and is expected to arrive in the country about the middle of October next.

While research work is undoubtedly needed, field work is also a necessity if the utmost possible benefit is to be obtained from your Scientific Department, and it is obvious that it is impossible for one man to do both over even a small part of such a big field as is controlled by the U.P.A.S.I.

These assistants will live and work in the districts employing them, and they will carry out investigations in the field and do the necessary field work to back up and amplify the work done in the laboratory. They will be able to make a special study of the conditions and needs of their districts and to interpret general advice, such as I am able to give, into particular advice for the district concerned.

They will also be able to conduct and carry out experiments, a most important part of any scientific work and one from which all final and definite knowledge in agriculture comes.

Research work in the laboratory gives indications that such and such procedures are probably the best, but these must be tested in the field. Two men are needed, one to study and suggest, the other to test and turn the suggestions into practical estate processes. Both should be in close co-operation constantly discussing results and adjusting details. The field man will constantly need analyses made and will be able to suggest new ideas and lines for study, and only by such a combination can real advance in knowledge be arrived at.

MANURING AND EXPERIMENT PLOTS.

In my last report I gave a list of proposed experiments which were said to exist in different districts. Many of these, I regret to say, have not been heard of since and exist only on paper. So long as there is no Assistant in the district to look after these experiments, and actually see that they are carried out, and make himself responsible for them, this is bound to happen. I strongly advise all the districts, or groups of districts, which belong to this United Association to follow the example of Mysore and Coorg and appoint Assistants. More especially I beg to offer this advice to that great group of districts interested in growing rubber. What they need is a chemist to live and work in the district, and to carry out experiments in a systematic and scientific way with methods of manuring rubber and methods of tapping and manufacture. Such a man should have a small laboratory at his disposal attached to one of the big factories where he could work on these special problems while the analyses and study of soils and manures, &c., and possibly of final products, could be done at Bangalore in my laboratory. By co-operation and help of this sort I feel sure much benefit would accrue, and South India would take its place in the front rank of those who are daily making new discoveries and learning to improve and cheapen the output of rubber against the coming of a synthetic rival, instead of being content, as at present, to follow some way behind and plod along with the mistakes that others have abandoned.

In this connection I would quote Mr. Herbert Wright who, in his last lecture at the Imperial College of Science, said that while one white man was provided to supervise every 300 acres of rubber for tapping and cultivation, only one mycologist was provided for 220,000 acres of Hevea in Ceylon, and two for 400,000 acres in Malaya. It was impossible, he said, for one plant sanitation officer to deal with anything like such an acreage. He regarded the paucity of scientific officers on rubber estates as one of the gravest errors of their administration, and he appealed to private companies and Government to tackle the problem now while diseases and pests were in their infancy.

I would appeal to South India where we have some 30,000 acres or more of Hevea with no mycologist, and some 120,000 acres or more of cultivation under the aegis of the U. P. A. S. I. with, until a few months ago, only one Scientific Officer.

Accounts of the experiments which have been conducted during the year have been published in the *Planters' Chronicle* from time to time. The most important have been the following:—

1. Manurial Experiments with Coffee.

   Several of these have been begun and they are mainly devised to test the value of Nitrolim, and to illustrate the benefit of a manurial system. With the advent of the Scientific Assistants, and the proposed co-operation of the Kalisyndikat, these manurial experiments will be developed and multiplied in Mysore and Coorg during the coming year.

2. The quantity of Mulch deposited from shade trees and its manurial value.

   This experiment is being continued as a manurial one to ascertain how far the Nitrogen in the Mulch is sufficient for the needs of the Coffee.

3. The Conservation in pits of composts of pulp and line sweepings.

   Experiments with these composts were made in several places and some of the results obtained will be reported at this meeting.

4. Leguminous green dressings for Coffee and Tea.

   A number of different plants are being tried, but more systematic experiments are needed which will provide figures for comparison.

5. The effect of fertilisers on the latex yield of Hevea Rubber.

This experiment was carried out in Mundakayam and, though not very conclusive, indicated that an application of Sulphate of Ammonia at the rate of half a pound per tree materially increased the yield of rubber, and gave a profit of about Rs. 10 per acre. Nitrate of Soda also produced an increased yield.

6. Manurial Experiments with Hevea rubber.

These experiments were carried out on Periyar Estate and a general well-balanced manure proved the most suitable. The experiments appeared to show that it was useless to apply any manure without an analysis and a good knowledge of the soil upon which to base it.

7. Pollarding Hevea Rubber as compared with cutting out when thinning becomes necessary.

Also conducted on Periyar Estate. The experiment showed that cutting out every alternate tree was the best method of thinning a thickly planted field.

8. The use of Arsenite of Soda as Weed killer.

Experiments with this weed killer were carried out in Coorg in Ceará Rubber. The conclusions arrived at were that the best means of getting the best results were :—

(*a*.) In high grass to spray first and cut down before the second application.

(*b*.) In grass about two feet high it is cheapest to rough grass-knife the place first and then spray twice.

The experiments are being continued in order to ascertain :—

(*a*.) The minimum number of sprayings a year necessary to get a place clean and keep it clean.

(*b*.) Whether it is cheaper to do this by using Arsenite of Soda or by ordinary weeding methods.

(*c*.) Whether the minimum application will in the long run do any harm to the permanent crop.

The Kalisyndikat of Berlin have offered to give a grant to enable certain manurial experiments to be carried out during next year in Mysore and Coorg under the management of the Scientific Assistants and myself. Their proposal will come before you during this meeting and I beg to recommend that it be accepted.

Work on Coffee Hybridisation was continued during the year. A hybrid of *Coffea arabica* and *Coffea liberica* is being experimented with, the object being to endeavour to produce a plant which will be disease resistant, and have an increased yield.

A number of such hybrids are now planted out on estates in different districts and are giving decidedly good results. On one estate a single hybrid was found to give a yield of seven pounds of clean coffee and a sample of this was valued in London at 76*s*. to 78*s*. per cwt.

A plot of land in the Nilgiris has been granted to the United Planters' Association of Southern India for the purpose of the study of Coffee hybridisation to be carried out by the Planting Expert and the Curator of the Government Gardens, Ootacamund. This plot has been cleared and planted up with a number of varieties of Coffee and with some hybrids of known character. Work will be conducted on 'Mendelian principles and by selection and crosses made between *Coffea arabica*, *Coffea robusta*, *Coffea stenophylla*, and 'Marigogipe' and the resulting hybrids studied. The expenses incurred in connection with the work are being met by the U. P. A. S. I.

LABORATORY.

As less time has been devoted to touring a certain amount of laboratory work was undertaken without fear of interruption, and a number of analyses were made. Much of the work begun during the year under review relates to investigations which are still in progress.

Analyses were made of samples of Mulch collected each month of the year from a measured area of Coffee on a Mysore estate, and an idea of the manurial value of this mulch was thus arrived at. It was found that something like four tons dry weight of mulch fall each year on an acre of Coffee under average shade, and that this mulch contains over 100 lbs. of Nitrogen. This interesting result must be taken into account in any rational system of Coffee manuring.

Samples of two new fertilisers have been examined during the year. The first was a high grade Fish Manure, and this has been reported upon in the *Chronicle*. The second was a phosphatic manure of the nature of Basic Slag known as 'Bernard Phosphate' and the report upon this is ready for publication.

Several leguminous green dressing plants have been analysed and an idea of their value as fertilising agents obtained. This work will be continued from time to time and the Scientific Assistants will carry out field trials in an organised way with a number of common leguminous plants.

Among investigations still in progress the following are the most important :—

An examination of the Limestone deposits from different districts in South India has been begun to ascertain whether a cheaper source of Lime then Shells at the Coast cannot be found for certain planting centres. This work is still incomplete but it is hoped to shortly be able to publish part of it with certain recommendations.

An investigation of the use of Coffee Pulp and the making of Composts with various materials on the estate is in progress. The first part of this work will form the subject of a lecture at this Meeting.

An investigation of the composition of Coffee Berries in progressive stages of development has been started, with the idea of possibly gaining a clue to the best time of the year at which to apply different fertilisers to Coffee.

An investigation of certain soils in Coorg and the Anamalais which afford special problems of cultivation and manuring is being carried out.

It is hoped that during the coming year time will be allowed to continue these investigations and undertake new ones which may suggest themselves, or be put forward by planters and the Scientific Assistants.

In conclusion I desire to record my very grateful appreciation of the kindly and sympathetic assistance I have received from Mr. Ormerod, the late Secretary of the U. P. A. S. I., not only throughout the past year, but over the whole period during which I have been associated with him. We have worked very closely together during the past three years and I owe much to his courtesy and kindness, and it was with a keen feeling of regret that I heard of his resignation.

RUDOLPH D. ANSTEAD,
Planting Expert.

Coffee Pulp and Composts.

Last year at the Annual Meeting I had the honour to address you on the subject of the use of 'natural manures' on the estates, and I pointed out that every estate supplies a certain amount of what may be called 'natural manure' in the nature of waste products which when fertilisers can be purchased cheaply it is perhaps not worth while to pay much attention to, but when fertilisers reach a high price and the crops a low one it is worth while paying attention to these natural resources.

In the case of Coffee there is a considerable quantity of a waste product each year in the form ot Pulp and I advised that this should be conserved and made into a compost in a water tight covered pit with lime and yard sweepings, such manure as is obtained from the cattle working on the estate, or visiting it in the transport carts, and the manure supplied by the stables.

On Tea and Rubber Estates, though the Pulp is wanting materials for making a good compost are at hand, factory sweepings, lime and yard sweepings and rough growth cut from waste ground can always be obtained.

During the past year experiments have been made in several places with such composts and I propose to-day to try and show you what can be done in the way of making them, and by the aid of a few analyses which have been made in my laboratory during the year to indicate the value of them. Incidentally I may be able to show you the value of having a laboratory at my command where one can ascertain and follow what is being done on the estate.

I began by investigating the composition of Pulp and the effect of the usual estate methods of treating it. I will now ask you to look at the Table of Analyses before you and I must here explain that Pulps and composts always contain a large amount of water, and this is a variable amount, so in order to be able to compare one sample with another the composition of the *dry matter* only in the different manures is given. The water factor will be considered later on.

In the first column of the Table you will find an analysis of fresh Pulp as it comes from the pulper calculated to a dry condition and if you compare it with the analysis of Indian Cattle Manure made by the Box System (which gives the best results) also calculated to a dry condition which is given in column 4, my first point will be clear, *viz* that

Coffee Pulp is a valuable fertilising material containing a high percentage of Nitrogen and Potash and comparable, when the composition of the dry matter in it is considered, with the best Indian Cattle Manure.

Hence it is obvious to start with that Pulp should be made good use of. Now the procedure on many Coffee estates is to leave this Pulp leaching and rotting in a pit, or in a heap, for six or seven months before it is applied to the Coffee. The result is that it deteriorates as is shown by the analysis in column 2 which was made of a sample of Pulp which had been treated in this way. It will be seen that though the Nitrogen content increases, owing presumably to the rotting process, Phosphoric Acid and Potash are lost, and more especially the latter, on account of the leaching effect of the rain. This Potash is lost in the drainage of the heap.

Another common practice is to mix Lime with the Pulp some time before applying it. The effect of this is shown by the analysis in column 3 of the Tables. While the Phosphoric Acid content is unaltered a lot of the Potash has again been lost by the leaching process and has drained away while one per cent. of the Nitrogen has been lost largely due to the action of the Lime no doubt.

The object of adding Lime is to neutralise the acidity of the rotten Pulp, but if the Pulp is properly composted it will not be acid, the necessity for the Lime and the resulting loss of Nitrogen is done away with. This brings me to my second point, namely that

Pulp deteriorates considerably in value by being left to rot down in a heap owing to the action of sun and rain and leaching. and it is also reduced in value by an admixture of Lime.

Before passing on to consider the results of our experiments on the proper manner of conserving Pulp, I wish to call your attention to the other figures relating to Pulp in the Tables before you. These are an attempt to estimate the monetary value of Pulp as compared with Cattle Manure and later on with Composts. The values arrived at are arbitrary no doubt but they will suffice for a means of comparison. Pulp is primarily a nitrogenous manure but the Phosphoric Acid and Potash in it must also be taken into account when we come to compare it with composts. I have therefore first of all calculated the value of the dry matter in fresh Pulp in terms of White Castor Poonac which is taken as containing 6% of its dry weight of Nitrogen. A ton of the dry matter in fresh Pulp is equivalent in Nitrogen content to 975 lbs. of Poonac and thus valued at Rs.32-10-0, White Castor being taken as costing Rs.75 per ton.

If the Phosphoric Acid and Potash are allowed for as well as the Nitrogen we may reckon a pound of Nitrogen bought as Ground Nut and Poonac, (its cheapest form) to cost 8 annas a pound of Phosphoric Acid bought in the form of Bone Meal as costing one anna and a pound of Potash, bought as Muriate of Potash, as costing two annas two pies. A ton of the dry matter in fresh Pulp then becomes worth Rs.37-10-0.

Now fresh Pulp as it comes from the pulper contains a large amount of water. The sample we are considering contained as much as 89·5%. Hence it would need in round figure 9½ tons of fresh Pulp to give one ton of the dry material of the analysis. which makes the value of a ton of fresh Pulp calculated to its plant food value Rs.4-3-0.

As fresh Pulp contains all this water it is unsuited for immediate application. It must first be rotted down, and I have shown you that the usual methods by which this rotting process is carried out cause a loss in its value.

The consequence is it must be composted in some way and experiments were made to ascertain the best way of making such a compost. Several mistakes were made which, however, are of value as showing what to avoid in the future. There is little doubt that the method employed has a profound influence on the resulting compost and its effect upon the crop to which it is applied.

On an estate in South Mysore a water tight tank was made of rough cement near the pulper. This tank measured 22 feet in length, 12½ feet in width, and 5 feet in depth, and cost Rs.75.

Into it was put the pulp from 26 tons of Coffee in layers; a layer of pulp covered with a layer of sweepings from the cooly lines, ashes, paddy husk, &c., and this was dusted over with two cwts. of Bone Meal, another layer of pulp put in and so on till the tank was full. This was left to rot down for about eight months. It yielded a little more than 20 tons of compost which was used to manure about 10 acres of Coffee. The analysis of this compost will be found in column 5 of the Tables before you. It was very dry and contained too much earth and stones which took away from its value somewhat.

Its monetary value may be calculated in exactly the same way as was adopted in the case of the Pulp. The value of the dry matter in it is seen to be equivalent to 417 lbs. of White Castor Poonac, or if all the elements of Plant food are taken into consideration it is worth Rs.20 per ton. But it contained very little water, only 3·88% in fact, and herein it differs very considerably from the fresh Pulp which was the basis of it, and it only required 1·04 tons of the Fresh Compost to supply one ton of dry material, so that the value of a ton of the compost as actually applied to the Coffee was Rs.19-3-0, hence it is nearly five times as valuable as the fresh Pulp. The actual cost of making this compost was estimated to be about Rs.4 per ton. The cost of the tank is not allowed for in this estimate as it is an asset and can be used again.

The next experiment was made in the Anamalais where a compost was made in a washing vat in the Pulp house. Into this was put the Pulp from the last two or three days Pulping of the crop together with one cwt. of Bone Meal and the straw and the droppings from the bandy stand in the yard. It was left till it had thoroughly rotted down when it had no smell and looked very nice, and it did no harm whatever to the vat. The analysis of this will be found in column 6 of the Tables and its value is much the same as that made in South Mysore.

In the Bababudins a compost was made experimentally on a more elaborate plan. At the bottom of a large pit dug in the ground 50 bushels of Pulp were spread in a layer about a foot thick; on this were put layers of the following materials in the order named, 6 bushels of Bone Dust, 2 bushels Sulphate of Potash, 75 bushels of jungle soil, 1½ tons whole Fish, 50 bushels Cattle Manure, 6 bushels Bone Dust, and 2 Bushels of Sulphate of Potash. This was repeated six times beginning again with Pulp. This gave about 100 tons of Compost and cost including the labour of mixing Rs.878. The analysis of the resulting Compost after being allowed to rot down for about a year will be found in column 7 of the Tables, It is rather disappointing owing to the fact that during a big storm during the monsoon a spring burst near the pit and leached the manure in it a good deal. A Compost made in this way is probably too expensive to be very practical, but it will be noticed that there is a considerable profit when its value and the cost of making it are taken into account.

Finally another methed of making a compost was tried this year. In this method a cattle shed is a made use of. Daily the floor is covered with 40 to 80 bushels of ceffee husk from dry cherry ooffee; over this 2 bushels of Bone Dust are sprinkled. This goes on from day to day for about a fortnight, when it is removed. All the dung and urine from the Cattle is absorbed by the husk. In 15 days about 1,000 bushels of manure are obtained at a cost, including labour, of about Rs. 2-8-0 per ton. The analysis of this Compost will be found in column 8 of the Tables before you. It will be noted that this is a good general manure containing a high percentage of Phosphoric Acid and Potash and very valuable.

In the last column I have repeated the analysis of Indian Cattle Manure made by the Box system with its value worked out for the sake of comparison. This manure is worth about Rs. 17 according to the standard adopted in this Paper.

These experiments which I have attempted to briefly describe to you are only in their infancy, so to speak. and they must be repeated several times before any really definite conclusions can be drawn from them. However, certain indications can be deduced I think of the probably correct methods by which composts should be made. We are aiming at making cheaply with the materials to hand a substitute for Cattle Manure. The nearest approximations have been the composts in columns 5 and 8, so that I think we are justified in concluding for the present that,

(*a*) If cattle are available, the compost is best made by spreading Coffee husk, or dry Pulp, daily on the floor of the shed, dusting it with bone meal, and allowing the cattle to trample it with their littor and removing it once a fortnight. If not applied to the coffee at once this manure should be carefully conserved in a watertight pit protected by a pandal from rain and sun.

(*b*) Where cattle are not available the Pulp should be allowed to drain, and placed in a speeially constructed water-tight tank and mixed with Bone meal at the rate of one cwt. per ton of Pulp, and with line and yard sweepings, and general estate rubbish.

Bone Meal is added in all cases because Pulp is deficient in Phosphoric Acid content. It appears to be uneconomical to make a complicated compost by adding Fish and Sulphate of Potash.

It is hoped to continue these experiments during future years so as to arrive at some definite and practical plan of procedure. I should welcome experiments with similnr composts made on Tea and Rubber Estates where Pulp is not available, with factory refuse, line sweepings, etc.

In conclusion my thanks are due to those planters who have carried out those experiments and who have kindly supplied me with the material for the analysis before you to-day. This paper is intended to be a progress report only and a brief sketch of what has been done, and I hope before long to treat the subject more fully in the pages of a special bulletin.

RUDOLPH D. ANSTEAD,
Planting Expert.

Analyses of Coffee Pulp.

		1	2	3	4
		Fresh Pulp.	Pulp left in pit for seven months.	Pulp to which Lime has been added.	Indian Cattle Manure. Box system.
* Organic matter...		84·76	71·29	67·40	56·90
Ash.	Phosphoric Acid (P_2O_5)	0·81	0·59	0·84	0·93
	Potash (K_2O)	2·38	1·19	1·82	3·26
	Lime (CaO)	0·57	1·78	14·46	......
	Insoluble matter	0·45	20·14	4·59	29·83
	Other Mineral matter	11·03	5·01	10·89	9·08
		100·00	100·00	100·00	100·00
* Containing Nitrogen		2·61	3·15	1·68	2·07
Nitrogen value per ton in terms of White Castor Poonac		975 lbs. Rs. 32-10	....	....	....
Value per ton when Potash and Phosphoric Acid are taken into account ...		Rs. 37-10	......	......	......
Moisture in fresh sample		89·50	......	......	......
Tons fresh pulp to give one ton dry		9·5	......	......	......
Value of one ton fresh Pulp		Rs. 4-3	......	......	......

Analyses of Composts.

		5	6	7	8	9
		Compost South Mysore.	Compost Anamalais	Compost Bababudins	Compost from Cattle Shed.	Indian Cattle Manure Box System.
Organic matter ...		30·29	45·13	28·95	36·08	56·90
Ash	Phosphoric Acid (P_2O_5) ...	2·17	1·18	2·79	3·27	0·93
	Potash (K_2O) ...	1·49	1·85	1·29	3·66	3·26
	Insoluble matter ...	55·21	33·12	52·04	56·99	29·88
	Other Mineral matter ...	10·84	18·72	14·93		9·03
		100·00	100·00	100·00	100·00	100·00
Containing Nitrogen ...		1·12	1·19	0·77	2·23	2·07
Nitrogen value per ton in terms of White Castor Poonac ...		417 lbs. Rs. 14	443 lbs. Rs. 14-13	288 lbs. Rs. 9-10	833 lbs. Rs. 28	772 lbs. Rs. 25-13
Value per ton when Potash and Phosphoric Acid are taken into account ...		Rs. 20	Rs. 21	Rs 16-6	Rs. 40-9	Rs. 34-7
Moisture in fresh Pulp ...		3·88	38·57	6·83	59·01	49·67
Tons fresh Compost to give one ton dry ...		1·04	1·6	1·07	2·44	1·98
Value of one ton fresh Compost ...		Rs. 19-3	Rs. 13-2	Rs. 15	Rs. 16-6	Rs 17-2
Cost of making one ton fresh Compost ...		Rs 4	?	Rs. 8-12	Rs 2-8	?

The Planters' Chronicle.

RECOGNISED AS THE OFFICIAL ORGAN OF THE U. P. A. S. I., INCORPORATED.

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THE U. P. A. S. I.

(INCORPORATED.)

Annual Meeting.

SECOND DAY, 13TH AUGUST, 1912.

The Delegates met at the Mayo Hall at 11 A.M. and at once went into Committee on Finance and after considerable discussion the Budget for the coming year, with slight modifications was adopted. In the afternoon the financial discussion was continued, affecting the Planters' Benevolent Fund, when resolutions were passed and confirmed in open meeting.

Bulletin.

Mr. Plowden initiated a short discussion with the view of eliciting the opinion of the Delegates regarding the future publication of these. Their value was recognised by all present and the general opinion was that they should be continued from time to time and that some charge should be made for them.

Experimental Plot.

On this subject coming up Mr. Anstead, Scientific Officer, said:—

"The Kalisyndikat have made the following proposals:—

(1) "That the Scientific Assistants of the U.P.A.S.I. may be allowed to carry out in the Districts of Mysore and Coorg manurial experiments with coffee, rubber etc."

(2) "That the Kalisyndikat should offer a subsidy of £100 per annum, commencing on the 1st January 1913, for each District, which amount is so far considered as being sufficient to cover the expenses of the experiments and the cost of the necessary manures, etc."

The Kalisyndikat point out that they are not especially interested in which form phosphatic and nitrogenous manures are applied, but lays stress upon the fact that the same are given together with sulphate or muriate of potash.

In return for this subsidy, the Syndikat expects to receive from time to time reports upon the progress of the experiments and these reports will be considered confidential, and not for publication. The final results are to be submitted to the Syndikat, but will not be published until such publication is agreed to by myself.

I suggested to the Kalisyndikat that coffee planters are fully aware of the fact that Potash, Phosphoric Acid and Nitrogen are necessary in any successful manurial scheme, and that I considered that it was quite unnecessary to carry out experiments to demonstate this fact again, and that I thought the experiments should be devised in order to discover

(*a*) the best form of potash to use in conjunction with available forms of Phosphoric Acid and Nitrogen,

(*b*) the right quantities of Potash and other manures to apply,

(*c*) what effect, if any, Potash may have upon the growth and latex yield of Ceará rubber.

The Syndikat have expressed themselves as being in agreement with me on these points.

Should the proposal of the Syndikat be accepted, and I strongly recommend that it should be accepted, I propose, in consultation with my assistants to draw up a schedule of the proposed experiments in each district and submit them to the representative of the Kalisyndikat in India on the one hand and to the District Associations concerned on the other, for their remarks and suggestions. It will also lie with the District Associations and the assistants to arrange where the experiments should be carried out.

I may say that the Districts of Mysore and Coorg have been chosen because they are the only ones at present in which assistants have been appointed, and it is impossible for me to undertake the responsibility of experiments unless there is a special officer in the district to take charge of them and personally supervise them. Should other districts in the future decide to appoint assistants, I have little doubt but that the Kalisyndikat would be willing to give them a similar grant for experiments. The Kalisyndikat propose to pay the grant directly to the U.P.A.S.I. and that it should be controlled by me and used to defray the cost of the experiments and the artificial manures at my discretion. The Syndikat will not pay for nitrogenous manures like *poonacs*, but only for artificials and administration.

I consider that the manurial problem is one of the most important as far as coffee is concerned, and I beg to recommend that the proposals of the Kalisyndikat be accepted with thanks."

The proposal outlined above was finally adopted and accepted by the Coorg and Mysore Delegates with thanks.

THIRD DAY, AUGUST 14TH, 1912.

On reassembling at 11 a.m. the morning was devoted to agricultural subjects. The Hon'ble Mr. Jackson, the Chairman of the Madras Chamber of Commerce and one of the Members of the Indian Tea Cess Committee, who was a visitor, kindly addressed the Delegates on the subject of the Indian Tea Cess and gave much interesting information and figures that clearly showed the advisability of continuing the compulsory cess during good years.

Fertilisers.

Mr. Anstead, the Scientific Officer, than delivered an interesting lecture which was received with great attention by every delegate. This important lecture was published in these pages last week.

THE EXPORT OF BONES.

Mr Barber, in introducing this subject, said that in a matter of this kind on which they were in agreement, there was a great danger that such an important subject did not receive proper discussion. All were so pleased to find something that they could agree about that a resolution was drawn up, passed unanimously, and the subject was forgotton for another year. This year the resolution that he was going to put before the Meeting was to bring to the notice of Government that the export of manures indigenous to the country was being carried out for the benefit of individuals. A lot of suggestions had been made with regard to this, such as that it was impoverishing the country and eating up the seed corn. It was also suggested that an export duty on bones would be an interference with vested interests. He did not think that in a matter of such importance to agriculture such a suggestion should be entertained economically, or considered by Government. It had also been suggested that an export duty on bones would lower the prices to the detriment of producers, but that perhaps this might be met by fixing a minimum price. He did not think that this was theoretically correct, because in a country like this, it was necessary that things like this should be as cheap as possible to the inhabitants, whatever the price might be to foreign purchasers. Mr. Mahon had given him some instructive figures regarding the export of bones and other manures, which showed that the bones exported in 1910-11 amounted to 8,181 tons, valued at Rs.4,26,994, ; fish manure to 14,061 tons, valued at Rs.6,30,745, poonac to 23,690 tons, valued at Rs.15,06.866. On looking at the statement where these manures went to it would be found that the bulk of them went to Ceylon. He did not think he need say anything more, but he would like the matter discussed and resolution he had suggested passed.

The subject was exhaustively discussed in Committee, when Mr. Graham moved the following amendment :—" Tha this Meeting is of opinion that a small Committee be appointed to go into the matter of the export of indigenous manures and submit a report before the next Meeting."

The following Committee, with power to add to its numbers was appointed :—Mr. Barber, Mr. Mahon and Mr. Anstead.

FOURTH DAY, AUGUST 15TH, 1912.

For the last day's session, the Delegates met at 12 O'clock and sat continuously until the business of this year's meeting was finished. Various matters of interest were discussed such as registering by Finger Pouts for which a Sub-Committee was named to receive the opinion of the various associations and non-service of warrants. Then the Meeting proceeded to elect the office-bearers for the ensuing year with the following result.

Chairman	... ...	Mr. C. E. Abbott.
Vice-Chairman	... ...	Mr. Mahon.
Vice-Chairman	... ...	Mr. Hughes.

Mr. E. F. Barber was nominated as Planting Member of Council at the election to be held in November. The elected gentlemen briefly acknowledged the compliments.

Mr. Mahon then proposed a vote of thanks to the Chairman for his services during the past year. He had had many difficult problems to face but they had been faced with courage, tact and sound judgment, and he was sure the Delegates owed him a hearty meed of thanks.

The Chairman in reply said :—" I am very much obliged to you for your great kindness in re-electing me for the second year running, and for the third time your Chairman. It is an unusual honour, and I think that in a general way it is not desirable that a man should hold office in this way for two years in succession. But in the very special circumstances of this year I feel that it is intended as a vote of confidence in me. I am very much obliged and accept it as such. I need not say that I shall do my best to carry out whatever work comes my way. We have got through a fairly long agenda paper in good time, and, though as I said before, this has been a year of quiet progress and no very controversial points have arisen which accounts for a good deal of this, it by no means accounts for all of it, and I have to thank you all for your cordial support of the Chair through the Meeting.

It is gratifying to myself and the Finance Committee that so many associations have agreed to pay the increased subscriptions and that all are now subscribers to the Scientific Officer Fund. I have been Secretary of my own Association for some years. And I know that it is often difficult to get members to agree as to the amount of support that ought to be given to the Central Association. We are now collecting a larger income than ever before. Our finances are on a sound basis again, and while it may be thought desirable that all associations ought to pay on the same basis, it must be remembered that the resolution passed last year asked the subscription from those who could afford to pay it and what we want to make sure of now is that there are no withdrawals. It may take a little time for all associations to come into line, and I am very strongly of opinion that the matter ought not to be forced in any way. I have to thank you again, Mr. Anstead, for all the assistance you have given me before and during the Meeting, and you Mr. Bremner for giving us the benefit of your long experience at these Meetings, when doubtful points of procedure arose. I would also like to convey the thanks of the Association to Mr. Krumbiegel for his kindness in sending plants to decorate our Exhibition. And lastly, Gentlemen, I thank you for the great friendliness and forbearance you all have shown me throughout. I now declare this Meeting closed."

Memo of Resolutions.

WEIGHTS AND MEASURES.

1. "That this Association approaches the Governments of India (through the Government of Madras), Mysore, Travancore, and Cochin and begs that further steps be taken towards the general standardization of all weights and measures in India."

"Also that all Chambers of Commerce in India be written to and asked to support the resolution."—Carried.

ROADS AND COMMUNICATIONS.

2. "That the Government once more be approached, through the auspices of the U.P.A.S.I., towards the opening up and development of the Province of Coorg by means of railway connection with the outer world." —Carried.

RAILWAYS.

3. "That this Association endorses the opinion of the Chamber of Commerce of Karachi and considers that the action of the Secretary of State is entirely contrary to the best interests of India and that the money at present invested at ridiculously small interest at Home could be much better utilised for the construction of light railways and communication roads which are urgently needed in the interests of the community generally and suggests that in the event of Government being unable to immediately finance the proposed schemes it withdraw all opposition to private enterprise."—Carried.

AHTOOR GHAT ROAD.

4. "That the District Board of Madura be asked to hand over the Ahtoor Ghat Road to the estates on the Pulneys, that are interested in its repairs and upkeep, and to allot Rs.1,000 (minimum) per annum towards its maintenance, provided that the estates concerned guarantee to spend at least Rs.700 per annum over and above that sum for the next 5 years."

" Also that the Board be asked, should the estates' contributions exceed Rs.700, that the District Board allotment may be increased proportionately. And further that the District Board be informed, should the above proposals meet with the District Board's approval, that the contributing estates are prepared to supervise the work on the road and to submit such accounts as may be deemed necessary by the Board."—Carried.

TELEGRAPHS.

5. " That this Association do approach the Government with a view to getting the cost of constructing public telegraph lines to planting districts reduced."—Carried.

CATTLE TRESPASS.

6. That the Government of Madras be asked to take steps to prevent the straying of cattle along public roads.—Carried.

TEA CESS.

7. "That this Association is in favour of the renewal of the Tea Cess for 5 years"—Carried.

THE S. I. P. B. FUND.

8. " That the Mercantile Bank of India, Madras, be asked to take charge of the investments and funds of the S. I. P. B. Fund and that cheques drawn upon the fund require the signatures of the Chairman for the year and the Secretary, U. P. A. S. I."—Carried.

THE "PLANTERS' CHRONICLE."

9. "That the *Planters' Chronicle* be continued as a weekly paper that the contracts made by Mr. Ormerod be fulfilled, that the Secretary, U. P. A. S. I., be appointed Editor and Manager and given half the profits as remuneration and that the accounts be kept entirely separate."—Carried.

ENGAGEMENT OF MR. FRATTINI.

10. " That this meeting confirms the engagement of Mr. G. N. Frattini as Scientific Assistant for Mysore."—Carried.

BULLETINS.

11. " That this meeting is of opinion that bulletins published on the same lines as the Peradeniya Pamphlets, dealing with Rubber, Coffee. Tea and other crops grown in South India would be of considerable interest to individual planters, should be published in conjunction with the *Planters' Chronicle* and that a charge of 3/ per annum should be made to include a copy of all bulletins issued during the year to all subscribers and that any surplus derived from subscriptions should be transferred to the General Fund of the U.P. A. S. I."—Carried.

EXPERIMENTAL PLOT.

12. " That the Kalisyadikat offer be accepted with thanks."—Carried.

SCIENIFIC DEPARTMENT.

13. " That the Scientific Department be asked to try and see their way to periodically verify the guaranteed analyses of manures sold by different

Manure Firms. It has been suggested that if the Scientific Officer has too much to do to undertake these analyses that perhaps the assistance from Mysore and Coorg might be spared for a month in the year to undertake these analyses."—Carried.

COFFEE FERTILIZERS.

14. "That the U. P. A. S. I. be asked to bear the subject of bees and fertilization in mind and that the Secretary be empowered to remind the Government of Madras to allow their entomologist to investigate the matter some time before the coffee blossoms next year and offer them all the assistance in their power."—Carried.

ADULTERATION OF COFFEE.

15. "That the Government be approached through the U. P. A. S. I. with a view of dealers in this country being restrained from selling coffee in tins, with a large percentage of cheap admixtures, under the name of 'Pure Coffee' without adding the percentage of adulterant."—Carried.

EXPERIMENTS.

16. "That as this Meeting considers the compost experiments that Mr. Anstead has done are of extreme value, he be requested to carry out further experiments on the same lines."—Carried.

ARTIFICIAL MANURES.

17. "That this Association do write to the firms supplying the commonly used fertilisers, to explain the difference in cost per lb. of Nitrogen, Phosphoric acid and Potash, as supplied by them."—Carried.

INDIGENOUS MANURES.

18. "That a small Committee, Mr. Barber, Mr. Mahon, and Mr. Anstead, with power to add to their number, be appointed to go into the matter of the export of indigenous manures before the next meeting."—Carried.

TOBACCO.

19. "That this Association do approach the Government of Madras with a view to tobacco being allowed to be imported by post into Travancore and Cochin; also approach the Trades' Association of Madras and obtain their support."—Carried.

EMIGRATION.

20. "That the Government of India through the Government of Madras be approached with a view to getting an explanation of the position they are taking up as regards the emigration of labour for Governments outside of India particularly as regards the labour going to the Federated Malay States and Zanzibar."—Carried.

LABOUR.

21. "That a scheme of registration read at this meeting be printed and circulated among District Planters' Associations in order that the subject may be considered thoroughly with a view to coming to some definite conclusion at the next U. P. A. meeting."—Carried.

22. "That a Sub-Committee be formed consisting of Messrs. Brock, Hughes, Abbott, Mahon and C. H. Brown—with power to add to their number—to receive the opinions of the various Associations and to harmonize them if necessary and to circulate a *working scheme* to the District Associations before the next Annual General Meeting with the idea of improving the labour position."—Carried.

23. "That the names of all known recruiters for places outside India be printed in the *Planters' Chronicle.*"—Carried.

NON-SERVICE OF WARRANTS.

24. "That the following suggestions be communicated to the D. I. G., Southern Circle, with the hope that he will give orders to all Superintendents of Police to give effect to these suggestions :—

1. That any Magistrate issuing the warrant to a Maistry should notify the District Superintendent of Police of the district concerned that such a warrant has been issued.

2. That all 'hand' warrants should also be endorsed by the District Superintendent of Police of the district in which the warrant is to be served or by his Office Manager.

3. That, on enquiry of a Planter as to the status of any particular maistry, the Superintendent of Police for the district in which the maistry lives shall make enquiries as to the maistry's standing and means, and report the same to the Planter."—Carried.

FINANCE.

25. 1. "That the Finance Committee consist of not more than 5 members namely Chairman, Vice-Chairman and Planting Member and the Chairman (or a Vice-Chairman) of the previous year. That the Secretary be Secretary to the Finance Committee.

2. That it is understood that the Finance Committee have direct executive control of all matters concerning finance or connected therewith."—Carried.

SECRETARYSHIP.

26. "That the meeting confirm the appointment of Mr. Norton as Secretary subject to three months' notice on either side and that the Chairman has power to give that notice should he deem fit to do so, Mr. Norton having the right of appeal to the Councillors, if necessary." —Carried.

AUDITORSHIP.

27. "That a further fee of Rs. 50 be paid to Mr. Haldwell as a special remuneration for the extra work entailed in introducing a new system of accounts."—Carried.

VOTING.

28. "That in future all voting shall be on combined subscriptions from each district at the rate of one vote for each Rs.10 subscribed, provided that such a subscription from any district shall not exceed the rate of 2 as. per acre."—Carried.

The U. P. A. S. I. Exhibition.

AN UNVEILING CEREMONY.

At the Exhibition held last year three portraits, the beginning of the U. P. A. S. I. picture gallery, were unveiled. During the year a handsome portrait of Mr. G. L. Acworth was presented to the Association and at the opening of this year's Exhibition on Thursday morning, 13th August, it was duly unveiled.

The Chairman, Mr. C. E. Abbott, first addressed those assembled as follows:—

" Mr. Acworth, who was Chairman in 1896 and Member of Council from 1900 to 1903 was a very good fellow and a born enthusiast who worked away at a measure until he succeeded. His work for the " United Planters' Association" was an example to those men of influence in their district who make the mistake of not coming to the Conference and expressing their views. Mr. Abbott did not wish to rake up the embers of a dead fire, but he could not help remarking that the energies of the association had for years now been devoted to the labour problem in all its stages, for which Mr. Acworth had done his very best, but they had been up against a stone wall ever since. Much had been promised to them in regard to railways, but those promises had been dropped. When thev offered to pay for their schemes their proposals had been pooh-poohed. When they asked questions they were told in effect that the authorities did not want to hear any more of their proposals on the subject of emigrations, also they could obtain no satisfaction. They had been seeking redress for the present situation for nine years, and had even instanced cases of cruelty to coolies without exciting reasonable interest. Their Coffee Cess proposal had also been pooh-poohed. The speaker could go on multiplying instances of such indifference, but perhaps it was better for them, after all, to have been left out in the cold so long. When they were taken back in favour perhaps their experience would be a lesson to them. He hoped, in conclusion that Mr. Acworth in his retirement would read in the *Planters' Chronicle* that they had at any rate done what honour they could to his memory."

Mrs. Abbott then unveiled the portrait amidst applause.

This year's display of exhibits was not so numerous as that of last year, but a very creditable show was made. The exhibits had been carefully arranged by Mr. G. N. Frattini, the Scientific Assistant for Mysore, aided by a Committee consisting of Mrs. Abbott and Mr. W. H. Reed, and thanks to the kindness of Mr. G. H. Krumbeigel who lent foliage plants from the Lal-Bagh Gardens the room was a bower of ferns and palms.

It is not possible in these pages to give a full list of the exhibits, but a few comments may be made on the various groups.

RUBBER.

The samples of rubber showed considerable advance, both in appearance and quality, to those of last year and very strikingly marked a year's progress. The exhibit from the Cochin Rubber Co., was the centre of attraction and the sponge-like masses of worm-rubber elicited much admiration. A nicely arranged exhibit from Eldorado Estate, Mundakayam, showing a number of different grades of crêpe was also much admired by the rubber experts, while Mr. L. E. T. Short's samples of Ceará Rubber coagulated with water without any acid showed what an advance had been made with this at one time despised and neglected source of rubber.

TEA.

An excellent display of Tea was shown this year from the Nilgiris and Travancore, and samples of various grades of Green Tea prepared for the Canadian and Russian Markets by Messrs. Harrison and Crossfield Ltd. were of great interest. The Pekoes and Orange Pekoes from Travancore exhibited in big packets also came in for much admiration. These Tea samples are going on to the Mysore Dasara Exhibition where they will probably carry off prizes.

COFFEE.

Only a small display of Coffee was made this year. The Hon'ble Mr. J. G. Hamilton exhibited some clean coffee of various grades, and Messrs. Brock and Bailey some tinned and roasted coffee.

MISCELLANEOUS.

Messrs. Parry & Co. exhibited a fine collection of samples of the various fertilisers supplied by the Presidency Manure Works Ltd., and the Scientific Department of the U.P.A. a few samples of special fertilisers, with their analyses, which had been examined during the year and discussed at the Meeting.

Messrs. Petrie Hay & Son most kindly exhibited some Coffee Machinery in the hall. This is quite a new feature of these annual exhibitions and a most interesting one and the thanks of all coffee planters present at the Exhibition are due to Mr. Hay, who was personally in charge of the Machinery, for all the trouble he took in the matter.

Mr. Kirwin exhibited some crude Camphor and the Scientific Officer gave a demonstration in his Laboratory during the course of the Exhibition of the way in which this could be refined and purified by a process of sublimation.

Taken as a whole the Exhibition may be considered to have been a very successful one and it certainly added interest to the Meeting. Warm thanks are due to the Exhibition Committee for all the trouble they took in the matter.

VISIT TO THE INDIAN INSTITUTE OF SCIENCE.

On the afternoon of Friday, 16th August, many of the Delegates accepted the invitation of the Officiating Director and Officers of the Indian Institute of Science to visit the Institute. A most enjoyable and instructive afternoon was spent in going round the various laboratories where work was in progress.

The Officers of the Institute personally conducted parties round the different Departments and it was difficult to say which was the most interesting; the Electrical Department with all its wonderful machinery obeying the will of Dr. Hays and apparently literally 'under his thumb,' since it moved when he pressed a button; the Chemical and Physical Research laboratories where Mr. Watson took infinite trouble to explain beautiful apparatus; or the Department of applied Science when Prof. Rudolf showed us things in the making.

Mr. Watson gave us all a great treat by showing us liquid air, not an unconvincing sample in a bottle which many of us have seen before in a museum, but pints of this wonderful liquid which could be poured from vessel to vessel, and though looking like water, froze everything put into it solid in a few seconds, even mercury.

Prof. Rudolf also delighted the more practical minded of us by showing us the machines at work, and the processes of soap making. wood distilling, and many other wonderful things actually going on on a large scale.

At the Institute everything is done perfectly, and this includes the entertainment of their guests. To the ladies who so kindly received us, and to Prof. Rudolf and all the Officers of the Institute cordial thanks are due for an extremely pleasant and instructive afternoon.

DISTRICT PLANTERS' ASSOCIATIONS.

Central Travancore Planters' Association.

Minutes of the Half-yearly Meeting of the above Association held at Twyford Bungalow, Saturday, 27th July, 1912 at 10 a.m.

PRESENT.—Messrs. F. Bissett (Chairman), T. C. Forbes (Vice-Chairman), W. A. J. Milner, F. W. Winterbotham, H. C. Westaway, J. A. Richardson, J. H. Ellis, F. E. Thomas, R. Mackenzie, S. C. H. Robinson (Honorary Member), R. D. S. Hodgins, W. E. Forbes, (Visitor) and R. P. Roissier (Honorary Secretary).

The minutes calling the meeting were read.

The Proceedings of last meeting were confirmed and taken as read.

Correspondence.—Read letter from the Chief Secretary to Government No. 4279 of 13th July, 1912 *re* Tolls. Read letter from the British Resident No. 268 of 25th June, 1912 *re* Tobacco Duty. Read letter from the Superintendent, Devicolum Division, No. 2 of 11/1067 of 3/4 June, 1912. Read letter from the Superintendent, Arnakal Grant-in-aid Dispensary of 15th July 1912, also letter from the Superintendent, Bonami Grant-in-Aid Dispensary of 15th July, 1912 *re* Grants. And the Honorary Secretary was instructed to write to the Superintendent of the Arnakal Dispensary asking the reasons why no Apothecary had been appointed to that Dispensary. Read letter from Honorary Secretary, South Travancore Planters' Association, dated 3rd July, 1912 and it was proposed by Mr. Forbes: "That this Association is quite agreed on the necessity and the benefits received by being members of the U. P. A. S. I. The Association, however, acknowledges that it would be of distinct use for Delegates of Travancore and Cochin Associations to meet annually to discuss local matter." Seconded by Mr. Westaway and carried unanimously. Read letter from Mr. M. M. Varugisa of 11th June, 1912 *re* Stolen Tea and it was proposed by Mr. Richardson and seconded by Mr. Thomas and carried unanimously: "That the Honorary Secretary be instructed to write the Superintendent of Police asking him for any suggestions as to the ways and means of preventing theft of Tea which is becoming a very serious matter in the District." Read letter from the Honorary Secretary, Kanan Devan Planters' Association of 12th June 1912. Read letter from Honorary Secretary, South Travancore Planters' Association of 1st July 1912. Read letter from the Chief Secretary to Government No. 6688 of 4th July 1912. Read letters from Secretary U. P. A. S. I. of 1st June, 20th June, 1st July also circular letters of 1st July No. 23/12, 17th July No. 26/12, 17th July No. 27/12, 17th July No. 25/12, 22nd July No. 31/12. It was decided that instruction would be given to the Delegate later and as regards exhibits of Tea for U.P.A.S.I. meeting the Superintendents of the following Estates promised to send in exhibits: Stagbrook, Ashley, Glenmary, Kuduakarnam and Ladrum. Read letter from Mr. C. E. Abbott to U. P. A. S. I. of 15th July 1912. Read letters from Mr. McArthur, Manager in India Travancore Tea Estates Coy., Ltd., of 12th June 1912, 27th June 1912, 1st July 1912, and 5th July 1912 *re* the withdrawal of this Company from the Association. Mr. Forbes then proposed the following Resolution: "That this Association very much regret the position taken up by Mr. McArthur, Manager in India of the Travancore Tea Estates Coy., Ltd., with regard to his resignation and to his refusal to pay his full year's subscription to the Association for 1912; and that this Association considers that the action taken by them is in order and that the interpretation of Rule 16 as taken by Mr. McArthur is wrong." Seconded by Mr. Ellis and carried unanimonsly. The Honorary Secretary was instructed to send a copy of this resolution to Mr. McArthur.

Election of Bangalore Delegate.—It was proposed by Mr. Bissett and seconded by Mr. Richardson: "That Mr, Westaway be asked to represent this Association at the forthcoming meeting of the U. P. A. S. I," and this Mr. Westaway kindly consented to do.

Motor Transport.—This important scheme was discussed at length and Mr. Ellis proposed "that a Committee consisting of Messrs. J. A. Richardson, R. Mackenzie, T. C. Forbes, and F. E. Thomas be formed to go thoroughly into the matter." Seconded by Mr. Westaway and carried unanimously.

Labour Rates.—The list of rates as sent in by members of the Association was then read and the rates discussed. Mr. Richardson proposed: "That a Committee consisting of Messrs. T. C. Forbes, F. Bissett, and R. P. Roissier be formed to go thoroughly into the matter of these rates and that the Committee have power to add to their number." Seconded by Mr. Ellis and carried unanimously.

Roads.—Read letter from the Sub-Division Officer No. 193 *re* Church Hill Road also letter from the Superintendent, Stagbrook Estate, on the same subject and it was resolved: "That the Honorary Secretary do write to the Chief Engineer and Executive Engineer on the subject."

Mannans Creek Bridge.—Letters were read from the Superintendent, Arnakal Estate, of 20th June and from Mr. McArthur, Manager in India, Travancore Tea Estates Coy., Ltd., of 17th June *re* the Bridge. Resolution by Mr. J. H. Ellis: "That the Chief Engineer be written to requesting him to send a responsible Engineer at an early date to inspect the Kudnakarnam—Ladrum Road and give his advice since the recommendations made by the Overseers who went over the road last year does not meet with our approval." Seconded by Mr. Winterbotham and carried unanimously.

With a vote of thanks to the Chair the meeting terminated.

(Signed) REGINALD P. ROISSIER,
Honorary Secretary.

South Travancore Planters' Association.

Proceedings of the Second Quarterly Meeting held in the Club, Quilon, on Saturday, August 3rd, 1912.

PRESENT—Mr. J. Stewart (in the chair), Messrs. C. Brander, S. A. Martin, W. H. Chalmers, J. B. Cook, S. W. Sinclair, R. Lamb, H. S. K. Morrell, L. G. Knight, T. L. Jackson, W. Cree, H. W. Heberden, A. H. L. White, Millbank and A. W. Leslie (Honorary Secretary). *By Proxy.*—Messrs. J. S. Valentine, E. C. Sherman, J. H. Parkinson, and R. Branson. *Visitors.*—Messrs. J. Mackie, A. F. Macdonald, and F. Mackay.

The Minutes of the last meeting were read and confirmed.

The U. P. A. S. I.—After a brief discussion. it was resolved to leave over for future meetings, the proposal re-seceding from the U. P. A. S. I.

Annual Meeting at Bangalore.—It was agreed that no delegate be sent to represent the Association at the annual meeting this year.

Roads and Bridges.—It was proposed by the Chairman and seconded by Mr. Sinclair: "That as a number of cart roads have been cut by different estates, and are now being used by Government, a list of these roads be sent in to the Honorary Secretary from the different estates, and that he be requested to write Government asking them to pay their share of the cost and maintenance."—Carried.

Importation of Tobacco into Travancore.—Read letter from Mr. J. A. Richardson, and resolved: "That his appeal receive the support of all Europeans in the state."

Mr. Knight's Resolution.—That the Honorary Secretary of this Association be asked to circulate all important letters was seconded by Mr. Cook and carried.

Associations' Banking Account.—Proposed by the Chairman: "That this be continued in the hands of Messrs. Harrison and Crosfield, Ltd., Quilon." Seconded by Mr. Sinclair and carried.

Conveyance of Mail Letters.—It was proposed by Mr. Heberden and seconded by Mr. Morrell: "That the Honorary Secretary be asked to write and complain to the Post Master General that letters from the districts are only carried to Quilon by the train reaching there at 5 o'clock in the evening and to suggest that a mail bag may be made up for the night train also, as great delay is caused by the present arrangements and further that all correspondence with the Post Master General regarding the delay in mails be in future sent through the Honorary Secretary."—Carried.

Arms Regulations.—Proposed by Mr. Cook and seconded by Mr Knight: "That the Honorary Secretary write to the Travancore Government, *re* the Arms Rules of 29-1-1912 and to ascertain whether the rule by which an annual license could be obtained to carry arms with sufficient ammunition through all Frontier Chowkeys is superseded, and further what is meant by their bye-law. No. V of 1084 29-1-1912 *re* transporting arms from one part of this state to another."—Carried.

Planters' Benevolent Fund.—The subscription list for 1912 was passed round the room and received good support.

Correspondence.—Read letter from Conservator of Forests *re* capture of elephants. Read letter from U. P. A. S. I. *re* the Benevolent Fund accounts.

A vote of thanks to the Chair terminated the Proceedings.

(Signed) A. W. LESLIE,
Honorary Secretary.

H. M. Minister at Bogota says *The Board of Trade Journal* reports that the prospects for this season's coffee crop in Colombia are favourable, and the yield is expected to be considerably larger than it was last year. It was at one time hoped that there would be a record crop, but the exceptional drought which has prevailed since November has caused much damage in most parts of the country and destroyed these hopes.

The Planters' Chronicle.

RECOGNISED AS THE OFFICIAL ORGAN OF THE U. P. A. S. I., INCORPORATED.

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THE U. P. A. S. I.

(INCORPORATED.)

Contents of present Issue.

At the Annual Meeting a desire was expressed that a special section of the *Chronicle* should be devoted each week to a short record of the work in progress in the Scientific Department, including the movements, &c., of the Scientific Assistants. With this issue, therefore, such a section is begun. It will usually be written by the Scientific Officer and will contain field notes of general interest received from the Scientific Assistants, analyses made in the laboratory, etc., and will in fact largely, if not entirely, replace the Scientific Officer's Notes and Comments.

The Scientific Officer's Paper this week deals with species of *Sesbania*, leguminous weeds suitable for green dressings. This paper is the first of a series which will be continued from time to time as material comes to hand.

A Ceylon Circular, (No. 17 of Vol. V) contained interesting notes and figures relating to a number of leguminous plants used as green dressings in Ceylon and it is hoped to gradually write up the Indian plants in a similar way.

In the Rubber section will be found a digest of the Annual Report recently issued by Mr. Lewton Brain, the Director of Agriculture in the Federated Malay States, which contains much that is of interest to Rubber planters in South India.

A Circular published by some well-known Rubber Brokers, containing a proposed system of manufacture to produce standard grades of Rubber on the estates is also re-produced from the columns of *The India Rubber Journal*. If the grades of plantation rubber were standardised, it should popularise it on the London market.

The Proceedings of Annual Meeting of the North Mysore Planters' Association appears in this issue. These Proceedings were received some weeks ago, but have been crowded out by the report of the Annual Meeting of the U. P. A. S. I. which completely filled the last two issues.

Names of Recruiters.

The Messrs. Goodfellow placed with the Secretary the names and addresses of the following recruiters with a promise that additions to their list would be furnished to the Secretary, U. P. A. S. I., for publication :—

W. A. A. Lawrence, Mysore.
Appooswamy, Trichinopoly.
Sivalingam, Salem.
R. C. D'Santos, Dindigul.
A. E. Wilson, Jalarpet.
A. Sundrum Iyer, Rajah Street, Coimbatore.
R. Stafford, Chief Station Master, Cuddalore.
Venkataramiyer, Salem Zemindari.

sample reported that the plants at the time they were beginning to flower had reached a height of five feet eight inches and the roots penetrated to a depth of two feet six inches and were covered with nodules. Sesbania roots are usually very prolific of nodules.

Of the analyses below, that of *S. aculeata* has been calculated to dry weight from figures published in the *Progress Report*, No. XLV, of the Ceylon Agricultural Society obtained from a sample of the crop as cut, while that of *S. aegyptiaca* was made in my laboratory on the sample from North Mysore referred to above, and is the analysis of the whole plant, leaves, stems, and roots.

			S. aculeata.	S. aegyptiaca.
*		Organic matter	92·8	88·81
	Ash.	Phosphoric Acid	0·5	0·89
		Potash	1·1	3·05
		Lime	...	1·13
		Silica	5·6	2·55
		Other mineral matter (by difference)...	...	3·57
			100·0	100·0
*		Containing Nitrogen	2·8	2·41

The dry material of the leaves, stems, and roots of *S. aegyptiaca* contained 4·78%, 1·21% and 2·8% of Nitrogen respectively.

RUDOLPH D. ANSTEAD,
Planting Expert.

COFFEE AND TEA IN SIAM.

Coffee growing in Siam, which has been an experiment by missionaries in Chantabon Provinces for some years, has according to a consular report, now been taken up by the general population, and coffee planting is being rapidly extended. At present the yield is only 10,000 to 20,000 pounds a year, all of which finds a market in Bangkok, where the taste of this coffee is finding favour with many Europeans.

Instead of being used for a beverage, the leaves of the tea plant, after being fermented, are rolled into balls, one of which is placed in the hollow of the cheek and allowed to remain there until the soluble contents have been exhausted by the saliva. This use of tea is common in northern Siam. The tea plant is cultivated to only a small extent, but is found wild on hill slopes. In lower Siam, tea drinking is indulged in to a considerable extent, especially among the Chinese.

The tea imports into Siam in the fiscal year 1910-11 amounted to 10,665 piculs (1,422,000 pounds), valued at $291,915, nearly all of which came from China and Hongkong.

THE SCIENTIFIC DEPARTMENT, U.P.A.S.I.

Mr. G. N. Frattini, Scientific Assistant for Mysore, left Bangalore for Birur on the morning of 26th August. He will be occupied for a few days in inspecting some Limestone deposits in the neighbourhood of Birur in connection with the investigation of this question which is being carried out by the Scientific Department, and after that he proceeds on a tour in South Mysore.

While in Bangalore Mr. Frattini took charge of the Exhibition in connection with the Annual Meeting of the U. P. A. S. I., and since the closing of the Meeting and Exhibition, has been engaged in discussing the tour he is about to undertake with the Scientific Officer, and upon laboratory work.

It has been said over and over again that the Coffee soils of Mysore are deficient in Lime content, that is to say contain less than one per cent. of calcium oxide, or 1·78% of calcium carbonate. During the course of the Annual Meeting a special Meeting was held at the Scientific Officer's Office to discuss the work which is being done on the Limestone deposits in Mysore and kindred problems, and it was suggested that certain soils in the Bababudins contained the requisite amount of Lime. Mr. G. R. Oliver kindly supplied a sample of soil from Santaveri Estate and Mr. Frattini carefully determined its Lime content. This proves to be 0·56% of calcium carbonate, so that this soil also is deficient in Lime content.

As stated in the Scientific Officer's Annual Report, the Limestone deposits in Mysore are being systematically examined, and it is hoped to be able to publish a report and certain recommendations before long.

Cassia occidentalis, a common weed, has not been recommended as a green dressing as a rule, and it has not been considered very suitable on account of the small number of nodules usually to be found on its roots.

An experiment which has been recently conducted with it in North Mysore has, however, given excellent results, and one feels inclined to argue that if such a poor legume gives such good results a really good one like *Crotalaria* or *Tephrosia* would give better results than planters have any conception of. The experiment in question is reported upon by the Scientific Assistant for Mysore as follows:—

" Fifteen acres of old coffee were cut down in 1910, the shade was cut out and the land round the coffee stumps was dug. Young shade was planted and in April 1911, *Cassia occidentalis* was sown. By August of the same year the green dressing had grown to such a height as to completely smother the coffee. It was then cut down and forked in. An enormous improvement in the coffee was noticed and it made wood rapidly. Last year the field gave a crop of four hundredweights an acre, a remarkable yield considering that two years previously it had been cut down within six inches of the ground.

An examination of *Sesbania aegyptiaca*, a leguminous plant very common in swamps and the neighbourhood of paddy fields in Mysore and Coorg and elsewhere has been experimented with as a green dressing for Tea in the Nilgiris and Wynaad and for Rubber in Mysore. An analysis of a sample of this plant has recently been made in the laboratory and the subject is discussed in the Scientific Officer's Paper No. 107 which appears in this issue of the *Chronicle*.

The work in progress in the Laboratory at head-quarters was detailed in the Scientific Officer's Annual Report and this work is being carried forward, and it is expected that Mr. Anstead will be at head-quarters for the next few weeks.

R. D. A.

DISTRICT PLANTERS' ASSOCIATIONS.

North Mysore Planters' Association.

Proceedings of the Annual General Meeting held at Balehonnur on August 4th, 1912.

PRESENT.—Messrs. C. H. Browne, Thos. Hunt (President), C. S. Crawford, E. H. Young, W. H. Reed (Honorary Secretary.) *By Proxy.*—Messrs. C. Danvers, H. G. Bonner, S. L. Mathias. *Visitor.*—Mr. Frattini (Assistant Scientific Officer.)

HONORARY SECRETARY'S REPORT.—"Gentlemen,—It is with great regret that I have to record the death of Mr. Trevor Roper whose loss will be keenly felt amongst us all. Owing to our financial year having been altered from January—December to July—June I have nothing of importance to report, as very little has been done during the past 6 months. Subscriptions have come in nicely and I must thank members for the prompt way in which they have paid up. Owing to the enhanced subscription several estates have been withdrawn, one estate has seceded to the Bababudin Planters' Association and two have failed even to reply to my repeated requests for their subscriptions. There are now 54 estates on the roll representing 10,284 acres, the total amount paid in subscriptions up to the 30th June is Rs.2,958-3-0 eleven estates have paid up in full and the rest for the half year ending 30th June. To meet the 1st instalment due towards the Assistant Scientific Officer Fund Rs.875 was borrowed from the Bank, this has been paid back plus Rs.12-15-9 interest. Out of the sum of Rs.157-7-0 interest on deposit account Rs. 63-1-0 has been placed on deposit thus bringing the deposit account up to Rs. 4,000. The balance has been placed to Current Account. A " Reserve Account" has been opened with the Bank and the Deposit receipt on Rs.4,000 is held by the Bank as security against overdraft. I have nothing to report on " Benevolent Fund" account as my predecessor has closed it to June 1912. I beg to submit my resignation of the Honorary Secretaryship."

ELECTION OF OFFICE-BEARERS.—The following were elected: Messrs. Thos. Hunt (President), C. S. Crawford (Vice-President), W. H. Reed (Honorary Secretary.)

MYSORE EMIGRATION ACT.—This Association is in favour of an Emigration Act in so far as it enables them (Mysore Government) to control the recruitment of coolies in the State to places outside British India.—Carried unanimously.

DASARA DELEGATE.—Mr. Thos. Hunt was elected to represent this Association.

COFFEE STEALING CONVICTIONS.—Mr. Pilkington's Case. Resolved that Rs.50 be given to the informer, Arni Sinappa.

COUNCIL OF MYSORE PLANTERS' ASSOCIATION.—The idea of a Council is approved of, but North Mysore is only prepared to form part of the Council provided the voting powers are arranged on an acreage basis. —Carried.

MANURIAL EXPERIMENTS.—This Association accepts with pleasure the Kalisyndikat's offer. A vote of thanks was passed to Mr. Anstead for the trouble he has taken in this matter.

Proposed "That the Honorary Secretary do write to the Scientific Officer asking if he can make arrangements by which the members of this Association may get their manures and soils analysed at a fixed and moderate price".—Carried.

TWO ANNA BASIS OF SUBSCRIPTIONS.—Resolution at meeting held on 13th May 1912 was confirmed.

U. P. A. S. I. AGENDA.—The subjects on the agenda were gone through and instructions given to the Delegate.

BASRECUTTY POUND.—It was decided "That Mr. S. L. Mathias' petition for a Cattle Pound at Basrecutty be forwarded to the local authorities with a recommendation that the petition be granted."

(Signed) W. H. REED,
Honorary Secretary.

THE USE OF FORMALIN ON RUBBER PLANTATIONS.

An article in the *Journal d'Agriculture Tropicale*, for January 1912, p. 15, by V. Cayla, refers to a warning that has been given already by that journal against the belief by planters that formalin is an anti-coagulant. Formalin actually prevents coagulation only in an indirect manner; it acts as an antiseptic. Through its interference with bacterial activity which would cause acidification of the latex, it indirectly prevents the coagulation of Hevea latex, which is produced in an acid medium. The explanation is necessary, because it may be alleged that the formalin itself prevents the coagulation of the latex. It is actually a coagulant. At a strength of 1 per cent. in water it is inactive as a coagulant, and in this proportion it is, if not antiseptic, at least capable of inhibiting bacterial life.

There is, however, a more complex question concerning formalin which, it is believed, has not so far been considered. The formalin (or formol) of commerce is theoretically a solution of formaldehyde at a strength of 40 per cent. When it leaves the manufacturer, it probably answers to this description; but the numerous changes that formaldehyde may undergo when it is kept for some time in solution are unknown, and the result is that when the formalin of commerce is being used, one hardly knows the real nature of the substance. It is possible that certain commercial kinds of formalin, at the time that they are being used, do not contain any trace of formaldehyde, but only modifications of that compound.

In the opinion of the writer of the article, these circumstances provide the reason for the great discrepancy that exists between the results of different investigators, in experiments in the coagulation of rubber latex by formalin, notably in the work of Chevalier, Christy and Fickendey. Although these experimenters worked under almost the same conditions, the reactions noted by them were different.

To summarize the matter, it is the belief of the writer that three points have to be remembered concerning formalin, in the special connexions it is a coagulant; it is an antiseptic; and it is a body of which, at the time of its use, one never knows the actual composition, and consequently there is the accompanying ignorance as to its coagulating value.

LIME AND ITS APPLICATION TO THE SOIL.

A plant will not grow in the absence of lime, but this substance is so widely distributed in nature that practically all lands contain sufficient lime to supply the needs of the plants that may be grown on it. Some time ago a paper was read by Mr. W. H. Harrison, M. A., before one of the South Australian Agricultural Societies, on the subject of the application of lime to the soil, and the reasons for so applying it:—

" Lime is very extensively used as a fertiliser, but its action is not generally well understood, and serious mistakes often occur from its indiscriminate use. Most soils contain all the elements of plant food in varying quantites, but, however, abundant the presence of most of these essential constituents, if any one of them be absent, the soil is perfectly barren, and if present in insufficient quantity the resulting crops are unsatisfactory to the extent of that deficiency. Lime cannot be classed among these deficient substances, for, although it enters into the composition of almost all forms of vegetable life its various compounds are so widely and generally distributed that it would be a very rare circumstance for any sample of ordinary soil to be found on analysis not to contain sufficient lime for the requirement of any cultivated plant. Then it may be asked, how is lime a fertiliser? Anything is a true fertiliser which causes a plant to make more vigorous growth and yield a better crop; and lime does this in a twofold manner—*viz.*, chemically and mechanically. First, as to its chemical action, all plant food to be available must be in a soluble condition. Otherwise it is like human food under lock and key. All soils contain animal and vegetable matter in varying proportion and in various stages of decomposition. Now lime, in its caustic condition, is one of the most powerful agents of decomposition, and where, from defective drainage or other causes the land is 'sour,' and where organic matter does not readily decompose, the application of caustic lime often works wonders, causing these previously inert substances to yield an abundant supply of available plant food. Probably this use of lime on land damaged by seepage would act beneficially. Again, lime and its compounds sometimes react with injurious mineral substances producing useful or harmless compounds, *e.g.*, the action of gypsum on carbonate of soda. The mechanical action of lime on heavy clay lands is an important aid to fertility, causing the soil to become friable and thereby giving free access to air and water. This mechanical action is shared by several of its compounds, such as gypsum, powdered chalk, pulverised shells, &c. The common mistakes in the application of lime as a fertiliser are the following:—When its *chemical* action is required on sour, boggy land, it should be spread and ploughed in as soon as possible after being slaked. It is often allowed to lie in heaps for weeks and months, when it absorbs carbonic acid from the atmosphere and becomes gradually converted into carbonate of lime or chalk. When spread and allowed to remain for some time before being ploughed in, the mischief is still greater. Considerable damage sometimes occurs from over-liming. Since caustic lime greatly promotes docomposition, there is a danger of bringing too large a proportion of plant food into available form, resulting in a heavy crop in the ensuing season and comparative barrenness for several years after. It is a common practice to add lime to nightsoil and other animal manures. Caustic lime sets free the amonia, thus depriving the manure of one of its most valuable constituents."—*The Queensland Agricultural Journal.*

RUBBER.

Rubber in the Malay States.

The Director of Agriculture in the Federated Malay States has recently issued his Annual Report and the following extracts from it are quoted from *The India Rubber Journal.*

It is noticeable that three new appointments have been made on the Scientific Staff, a Mycologist, a Chemist, and an Assistant Superintendent of Government Plantations. Each year South India are left further and further behind in the march of Scientific progress.

During 1911, 107,200 acres of Rubber were opened, and the total output of Rubber for the year was 21,809,617 lbs. The producing acreage is returned as 105,653 acres, so that there is an approximate all round yield of 200 lbs. per acre, but it must be remembered that some of the acreage only came into bearing in 1911 and was only tapped part of the year, and abnormally dry weather was experienced at the beginning of the year. The total acreage planted at the end of 1911 is given as 352,074 acres.

Discussions still continue as to the best planting distances, though wider planting has become more and more in favour. Mr. Brain states that he does not think that any observer going round some of the older clearings and seeing the manner in which closer planted trees are crowding their foliage together, are losing their lower branches from light starvation, and are failing to renew their bark properly, can fail to come to the conclusion that a hundred trees to the acre is the maximum number that should be allowed. Even if this is reduced to 80 by accidental losses, and by disease and pests, there would still be ample number to occupy the ground and air. Whether planted 20 by 20 or 13 by 15 is a matter more of convenience in working than of any fundamental importance.

Catch crops are still little in favour and practically only used where it is absolutely necessary to secure a certain amount of revenue before the rubber trees come into bearing. In the F. M. S. only 13,382 acres under rubber are interplanted, or less than 4 per cent. Coffee Robusta accounts for 5,411 acres of this total and is the principal catch crop grown. Over 2,000 acres are under rubber and cocoanut, which Mr. Brain describes as a particularly unsound mixture of two particularly sound cultivations. Sugar gambier, tapioca, and pepper probably account for the remaining unplanted area. In the Straits Settlements 9,000 acres, or 11 per cent., are interplanted. In both districts there is an actual decrease in the interplanted acreage.

The Department of Agriculture is still experimenting with a view to finding a suitable cover crop, some 20 species of leguminous plants having been tried at Kuala Lumpur during the year. The ideal to be arrived at is a rapidly growing plant which quickly shades the soil sufficient to keep down the weeds. It must also have a short life, so that within a year it can be cut down, dug in, and resown, thus providing for cultivation as well as eradication of weeds. The cultivation usually given to rubber trees is hardly worthy of the name, consisting in the majority of cases of scraping the surface of the soil to remove the weeds. In Mr. Brain's opinion more than this is required to induce and maintain healthy soil conditions. At least once a year, if not twice, it would be advisable that the soil should receive thorough cultivation to a depth of at least four inches. In many cases, he says, the condition of the soil would be further improved by the addition of lime. A large number of enquiries have been received during the year as to the advisability of manuring. While in certain cases, manuring may be required as shown by backward growth and the starved appearance of the rubber trees, yet Mr. Brain is of opinion that this is not so in most cases.

Tapping of rubber trees is an important matter, both as regards the quality and the quantity of the bark removed. As regards the quantity of the bark removed, a conservative procedure is more and more coming into favour, and very few estates now allow less than four years for renewal of bark. A research is being carried out by Mr. Bateson, Assistant Mycologist, on the depletion of the food reserves of Para rubber trees by tapping and the natural demands on the vitality of the trees. The quality of the tapping, the number of cuts to the inch, and the proper depth of the cut is a subject in which the planters, as a whole, are keenly interested. Twenty cuts to the inch is a very good average, although a good, many more than this are claimed by some estates. When it is considered that a good coolie will do over 1,000 cuts per day, in addition to bringing in his latex, washing cups, pails, etc., it is evident that it requires highly skilled labour to avoid all mistakes.

With a view to testing the actual commercial value of the raw rubber produced in the country, the purchase of an experimental vulcanizing plant has been approved for 1912. When this is installed it is hoped that the Department will be able to make definite experiments on the commercial value of rubber produced by different processes. It is not expected that this will be in working order until the end of 1912.

The Agricultural Chemist has been working nearly all the year on special research work on rubber coagulation and curing. A large number of interesting facts have been ascertained, and a report on the subject will shortly be published. A small experimental smoke-house of the Kent hop drying type has been erected during the year, and has proved very useful.

Plantation Rubber Preparation.

Messrs. Wm. Jas. and Hy. Thomson, the well-known rubber brokers, says *The India Rubber Journal*, have just issued an interesting Circular containing a number of suggestions regarding the preparation of plantation rubber for the London market, formulated by Mr. Roger E. Thompson, who has lately returned from a visit to Ceylon and the Malay Peninsula, where he went for the purpose of studying the preparation of plantation rubber.

Throughout the whole of Malay and Ceylon, says the Circular, the general preparation of plantation rubber is of quite a high standard, but few as yet have thought seriously enough of further improvements and economics that are possible in many details.

One of the leading questions put to the Managers of estates was, "What percentage of dry rubber of each grade do you make from the daily intake of latex and scrap?" In many cases the answer was that they could "work it out," but more often the idea appeared to be a new one to them, except as as a more or less vague guess at the proportion of first latex. To this generally there were, of course, a few notable exceptions.

Mr. Thompson soon saw that the best method of counteracting this attitude was to formulate what may be called an ideal system of make, which he put before various Managers for purposes of discussion, and found without exception that they were willing to fall in with his ideas and to grasp their importance.

The following is the basis of the system suggested :—

That No. I grade should be made from the first latex carefully strained into the coagulating receptacles and made into either crêpe or smoked sheet according to instructions. It is a good plan to bulk the latex brought in from different divisions of the estate so as to ensure a uniform colour in the day's make.

No. II grade from the naturally coagulated lump which should be carefully removed from the pail *before* the latex is poured into the strainer, and made into crêpe.

No. III grade from the scrap pulled off the trees, made into crêpe.

No. IV grade from the bark shavings, made into crêpe.

No. V grade from the earth rubber, made into crêpe.

All crêpe should be made the same day as the latex is collected, as by keeping it overnight it is sure to lose colour through oxydization.

Daily percentages of dry rubber made of each of the above grades should, continues the Circular, be carefully registered, as it is only in this manner that the Manager can check the quanities of each grade that his labour force is collecting.

Another important reason for knowing the percentages is, in case the owners of a plantation wish to make forward contracts for the whole of their out-turn, they will then be in a position to indicate to the buyer the percentage of each grade that he may expect to be delivered to him monthly, which at once enables him to make a closer price.

It is obvious that the ideal to work for is to make as big a percentage of first grade rubber as possible, and any method by which No. I grade can be increased at the expense of No. II., and No. III at the expense of No. IV, and so on, it is easy to see, will result in a more profitable return ; bearing in mind that No. I is of better quality than No. II, No. II better than No. III, etc.

To return once more to the grading mentioned above, No. II hitherto has been made up into crêpe of a more or less spotted appearance owing to the lump having been poured wholesale into the strainer together with the latex; the said lump being used very often for rubbing the latex through the fine wire mesh, thereby gathering up all the dirt on the strainer, and spoiling what can be made into quite a fine, clean crêpe, in some cases very nearly, if not quite, equal to first latex. This lump also is very often made up with No. III grade, thus spoiling clean latex by mixing it with tree scrap.

On plantations where cup washings are collected in a second pail, the resulting latex will possibly be good enough to go into No. II, but it must not be added to it if No. II thereby suffers in colour. Where cup washings are not collected at the time of lifting the cups, and instead, the film of rubber adhering to them is pulled out of the cups from time to time, the result should go into No. III.

Of course, this varying distribution of rubber collected, amongst the different grades made, must be at the discretion of the European in charge of the factory, as the method of work and collection on each plantation is bound to vary to a certain extent ; but the necessity for greater care and organization in the preparation of rubber is obvious, as these " minor economies," which, at the present profitable price of rubber they may be called, will some day figure largely as the margin of profit becomes less, and there may be other factors in the market that we shall have to consider, beyond the mere question of over-supply, that will necessitate the strictest economy in the cost of production.

One other point that is of importance is to make sure that no fine splinters of wood are allowed to come into contact with the rubber; there are two sources of this trouble. One is, the rough planing of the insides of the wooden chests, and the other, the rough and splintery battens that are sometimes used, upon which the crêpe is hung up to dry. Both these defects should be fairly easy to avoid. The Manager must insist that the Momi chests supplied to him are well planed and smooth inside, even if he has to pay a few cents more for them, and he should also see that his battens are carefully sandpapered over, and splinters entirely removed. It may be added that a well-known F. M. S. Planter, who is now at home on leave, has seen the above and entirely endorses these views.

Rubber in Bengal.

In a statement dealing with the administration of the forests of India, says *The India Rubber Journal*, presented to Parliament by the India Office, it is said there are 96,000 square miles of reserved forests, and outside the reserves about 150,000 square miles of State forests. In Bengal the cultivation of *Ficus elastica* for rubber will probably not be continued as it does not seem likely that it can compete with Pará rubber. In Burma further experiments were made with the cultivation of rubber, and Pará rubber is said to be growing very successfully in the Bhamo Division. In Eastern Bengal and Assam the Charduar and Kulsi Plantations of rubber produced satisfactory results, and its cultivation is being extended to the Lushai Hills and elsewhere. In the Andamans attention is also being paid to the cultivation of rubber.

The Physical Constitution of Latices in "The Rubber Industry"

An interesting paper was read by Mr. H. C. T. Gardner on this subject and on the relation of coagulation thereto. The author first discusses the composition of the latex and points out that the rubber globules must be distributed in the aqueous serum in a state of emulsification, since otherwise, as rubber is lighter than the serum, the globules would rise. He further points out that emulsification is closely connected with surface tension. Mentioning the view that coagulation depends on the destruction of a film of protein surrounding each rubber globule, he quotes Spence, who found that more than half the proteid of the latex of Hevea and Funtumia can be removed without coagulation taking place. He also mentions some experiments of his own with various latices, which show that after the protein has been acted upon by a ferment, and then removed by dialysis, coagulation did not occur. This point is certainly extremely important, and it is to be hoped that the author may be able to pursue it further. He concludes that coagulation is a purely physical process " that the albumins (proteins) while probably acting as emulsifying agents, are not concerned in de-emulsification and each rubber globule is surrounded, probably, by a discontinuous film of particles either liquid or solid and the permanence of the physical equilibrium of the latex depends on the viscosity of the emulsifying agent and on the magnitude of the caoutchouc globules, *i.e.*, the smaller their size the greater the viscosity."

It appears impossible to come to any definite conclusion without further experiments, but at all events the view, that the albumins probably act as emulsifiers but are not concerned in de-emulsification, seems to require considerable qualification.—*India Rubber World.*

The Planters' Chronicle.

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Contents of present Issue.

A short account is given of an interview between Mr. Goodfellow, Attorney for Messrs. Carson & Co., of Colombo, and the Secretary about the recruitment of Labour.

A letter from Lieut.-Col. Gayer, Assistant Director of S. & T. 9th Division in regard to Petrol Driven Lorries is reprinted, as it is considered to be a subject of importance to Districts not closely in touch with railways; and suggestions are invited, especially as regards rates on which to base a reply. Only one reply has so far been received, which, though interesting is not very illuminating; but is published *pour encourager les autres.*

Two letters are published. and will it is hoped lead to others of general interest, and the Managing Editor would be obliged if readers who do not care to submit original matter, would send in cuttings from their papers, that would lend variety to the *Planters' Chronicle.*

The Scientific Officer contributes two papers of great interest to the planting community, one entitled 'Lime in Basic Slag' and the other on a New Fertiliser known as Bernard's Phosphates.

Coolie Recruitment and Emigration to Ceylon.

It will be remembered that a good deal of outspoken criticism took place at the last Annual Meeting when this subject was brought up by Mr. Dickins of the Shevaroys. That criticism appears to have evoked from the Ceylon Press language of an unnecessarily virulent and violent description. A bad case is generally backed up by vituperative language. After the Annual Meeting was over Mr. Goodfellow called on the Secretary to explain and to apologize for the conduct of his recruiters in distributing the leaflets amongst Mr. Dickins' coolies and in the bazaars near Estates, without his knowledge or sanction; and the Secretary has it in writing from Mr. Goodfellow, the Attorney of Messrs. Carson & Co., of Colombo, to the following effect:

"Should any recruiter distribute this notice in or near any Estate or Estate bazaars, he will immediately be discharged."

The Secretary also procured in writing from Mr. Goodfellow; "Nor to employ any petty official to assist in recruiting."

Mr. Dickins has rendered yeoman service in drawing general notice to this very important matter.

Scientific Officer's Papers.

CVIII—.LIME IN BASIC SLAG.

Basic Slag is a very widely used fertiliser on estates in Southern India and its particular value on the type of soil to which it is applied which contains only a small precentage of calcium oxide and carbonate lie in the fact that it contains a large proportion of lime and it is alkaline in reaction, while at the same time its phosphatic content is easily soluble in weak acids and is therefore readily available for plants.

It is a common belief that Basic Slag contains a large proportion of "free lime", that is lime as calcium oxide. This is a statement which will be found in many of the standard text books on Agriculture, but it was shown by Mr. J. Hendrick, B. Sc, to be a fallacy. In 1909 he published a paper on the subject in the journal of *The Society of Chemical Industry* (xxviii-14) in which he showed that if the free lime present in Basic Slag is carefully determined it will usually be found to be under two per cent.

Basic Slag is a bye-produce from the manufacture of steel by the Bessimer process and when this process was first invented a greater excess of lime was used that is done at the present day. There have been great alterations in the process during the last twenty years and the composition of the bye-product, Basic Slag, as altered accordingly.

While the amount of free lime in Basic Slag is then in reality very small, this in no way detracts from its value as a fertiliser for it contains a large amount of lime which is available as a base. From an agricultural point of view it is this lime available as a base which is important and not merely the free or caustic lime. Lime which is so loosely combined as to be capable of neutralising acidity and acting as a base during the processes of nitrification by the soil bacteria is what is needed in the soil, and this Basic Slag supplies to a high degree.

Hendrick's investigations show that the basic lime in Slag is not only a variable quantity but that it consists of lime in various forms of combination. A little of it is free caustic lime, the rest is in combinations such as silicates and basic phosphates. A part of this combined lime is readily liberated and will probably readily act in the soil as a base; other portions are only liberated with greater difficulty and slowly. As the conditions are very complex it is impossible to draw any line and state an exact percentage of basic lime in Slag except in terms of a strictly defined method of determining it.

Having recently had the necessity of making an analysis of some Basic Slag in my laboratory, Hendrick's methods were adopted. The results are published elsewhere in this number of the *Chronicle* (see Scientific Department) but it may be said here that a higher percentage of free lime was obtained than Hendrick got in the samples he examined, namely, 4% but that his point is fully borne out, for the Lime available as a base was found to be over 14%.

All this may appear to the practical planter as of little moment, but it as well to be correct in our ideas and to give up talking of and thinking of the lime Basic Slag as being "free" and to think of it as being available as a base in the soil.

RUDOLPH D. ANSTEAD,
Planting Expert.

THE SCIENTIFIC DEPARTMENT, U.P.A.S.I.

A New Fertiliser.—In July a sample of a new Phosphatic Fertiliser was received from Messrs. Peirce, Leslie & Co., Ltd. This is called "Bernard's Phosphate" and very much resembles Basic Slag. It is a fine white powder, so fine indeed that it practically all passes a sieve with 100 meshes to the inch. The fineness of Basic Slag and similar fertilisers is a very important point. They are only slightly and slowly dissolved by weak acids such as are found in the soil, and therefore they must be well incorporated with the soil and expose as large a surface as possible to the action of the solvent in order that the phosphoric acid present may be got into solution and thus become available to plants. It was only when machinery was invented to grind Basic Slag very fine that it became suitable for use as a fertiliser. Fineness is usually expressed by the percentage which will pass a sieve with 100 meshes to the inch. Thus when Basic Slag is said to be 95 fine, it means that 95% passes the standard sieve. The sample of Bernard's Phosphates was 99·9 fine.

Messrs. Peirce, Leslie & Co. inform me that this new fertiliser is a Belgian product and that it is made with "Phosphated Fossil Chalk as used in steel works for the manufacture of high grade Basic Slag."

An analyses of the sample was made and at the same time a sample of Basic Slag kindly supplied by Messrs. Peirce, Leslie & Co., was analysed to act as a comparison. These analyses are given below together with some figures showing the comparative cost of the two fertilisers.

	Bernard's Phosphate.	Basic Slag.
Total Phosphoric Acid (P_2O_5)	27·03	18·87
Citrate Soluble Phosphoric Acid	4·38	16·15
Total Lime (CaO)	29·26	32·13
Free Lime	10·25	4·20
Lime available as a Base	22·54	14·28
Insoluble matter	5·03	13·56
	Rs. A. P.	Rs. A. P.
Price per ton	60 0 0	65 0 0
Cost of a Unit of Phosphoric Acid ...	2 15 4	3 7 1
Cost of a pound of Phosphoric Acid ...	0 2 1·36	0 2 5·5

It appears therefore that though Bernard's Phosphate is a cheaper form of Phosphoric Acid than Basic Slag it is not in such an available form, very little of it being soluble in Citric Acid, and it will be a slow acting fertiliser. It contains a large amount of "Lime available as a base," the significance of which item is explained in the Scientific Officer's Paper in this issue of the *Chronicle*, and it is undoubtedly worth a trial against Basic Slag. Messrs. Peirce, Leslie & Co., are prepared to supply small quantities of it at specially reduced rates in order to induce experiments being taken in hand.

Preparing Botanical Specimens for Transit.—It often happens that correspondents forward to me a flower, or a few leaves, or some portion of a plant, with the request that I will name it for them. It is next to impossible to identify a plant from such material. The Colonial Botanist in a recent number of the *Queensland Agricultural Journal* gives the following simple and explicit directions for collecting botanical specimens which have to be sent by post for naming, and future correspondents cannot do better than make a note of these directions and follow them exactly.

"A botanical specimen is such a portion of a plant as may enable a botanist to determine its name, &c. Thus, of a tree or shrub, a shoot, say 6 inches or 9 inches long, bearing leaves, flowers, and fruit, if possible, will be sufficient. Of herbs when small, an entire plant should be sent, collected when in flower. Of herbs of a large size, a portion of the lower (radical) leaves and also a portion of the top, in flower or seed. All specimens should represent the typical form—not an abnormal or irregular growth, except to show such growth. After gathering, place the specimen between sheets of paper (old newspaper), and put the whole under a slight pressure; these papers should be changed for dry sheets every day for three or four days, when, if the specimens are not of a succulent nature, they will be in a fit state to forward by post."

Camphor.—In view of the increasing interest which is being taken in the cultivation and preparation of Camphor in Southern India the following synopsis of a paper by Lommel on the preparation of camphor from dry leaves given by Messrs. Schimmel & Co. in their Semi-Annual Report for 1912 will be of interest. When using a small still only it would be of advantage to use dry leaves and this increases the camphor content of each charge. and the method is well worth a trial by those who are experimenting with Camphor distillation on their estates.

"The author first deals with the distillation of leaves which had been spread out for drying in a small cinchona-plantation shortly before the setting in of the rains, but which were not yet quite dry. The Camphor yield from these leaves was too small to make it worth-while estimating it, and the experiment was set down as a failure. For a subsequent distilling-experiment a plantation was subjected to moderate cutting, when a quantity of dry fallen leaves was found on the ground between the rows of plants. These were first distilled and only yielded 0·06% crude camphor and 0·19% camphor oil, showing that they had lost almost the whole of their volatile constituents during the long time they had been lying on the ground drying, exposed to the alternating effects of rain and sun.

"Next the green leaves were dried on previously cleaned ground under the shade of cultivated cinchona trees. In the course of about a fortnight they were dry enough to be readily stripped from the branches and, collected in sacks, they were carried to the still. The experiment gave a thoroughly satisfactory result, the yield being 1·55% crude camphor and 0·49% camphor oil. The result would certainly have been better still but that on one occasion, in the course of the distilling process, the condensing-water became heated, and a not inconsiderable quantity of camphor was thereby lost.

"In view of the fact that present experience on the effects of cutting upon the growth of trees shows it to be a pretty well established fact that it is possible to cut the trees twice a year, it is reasonable to expect a five-year old plantation to yield about 8,400 lbs. of dry leaves per acre. This would be equivalent to an out-put per acre of about 325 lbs. of camphor and about 103 lbs. of camphor oil."

The Scientific Assistant for Mysore.—Mr. G. N. Frattini has spent several days investigating the Limestone deposits near Birur and the method of working them. Samples have been taken and forwarded to head-quarters for analysis. These deposits appear to be extensive, and should the raw material prove of a suitable kind, it is possible that something might be done to exploit them as a cheaper source of Lime for some of the planting districts than any which now exists. On 1st September, Mr. Frattini began a tour of South Mysore, proceeding to Subbanhulli Estate. from whence he went on the 6th to Bettadmame Estate.—R. D. A.

CORRESPONDENCE.

Petrol Lorries.

The Managing Editor.

Sir,—I read with interest the notice in the *Planters' Chronicle* of August 17th with regard to the employment of Motor Lorries by planters and in reply have to state

(1.) planters in these parts would, I should say, at least I would, be only too glad to employ them to take coffee down to Mangalore during crop time if

(*a*) the authorities would take the coffee at a reasonable rate per ton.

(*b*) If the lorries could not get up to all the estates to come as near as practicable. the present route for coffee from these hills is very unsatisfactory, *viz.*, it goes by cart to Birur and from there by rail to Marmagao, then put on board a steamer to go *south* to Mangalore, discharged into boats and landed at Mangalore, carted to Works and when ready is carted from Works to Bunder and loaded into boats, transferred to steamer to go *north* again to Bombay, where it is once more transhipped to P. & O. and warehoused till a steamer is available.

Whereas Mangalore is only 95 miles from Chikmagalur and this Estate is 44 miles from Chikmagalur, others nearer.

A question for the authorities to ascertain is whether the culverts, bridges, etc., on the road are capable of carrying the lorries with their loads and if not whether the Governments through whose territories the road passes will make them so.

In my opinion a great use might be made of petrol driven lorries in this country. In England it is overdone to the detriment of the roads, but in this country nothing is done.

Yours faithfully,

(Sd.) G. R. OLIVER.

Kesinvurthy Estate. Santaveri,

Birur, S. M. Ry., August 28, 1912.

Labour Bureau.

The Editor,

Planters' Chronicle.

Dear Sir,—It has come to my notice that the Mysore Government are proposing Relief Works on account of scarcity in certain taluks.

Would it not be possible for the Mysore Planting Associations to approach the Government with a view to assisting us—the Mysore Planters

—first and incidentally themselves by enabling us to get some of the coolies who need relief. A Labour Bureau in fact, one more Bureau won't matter. Government do nothing for us, and we suffer dreadfully from legislation *re.* cooly contracts in the local courts and from the extradition nonsense. What I would suggest would I imagine not cost Government ten rupees to a thousand otherwise spent by them.

I think 3 or 4 Government officials on about Rs.30 each one with 3 peons for work—collecting, escorting, &c., would be enough for a taluk—and we should get all the labour we need in 3 months' time. There is always the possibility that some of these coolies might come another year.

I should propose we pay a Bonus on coolies landed, to the Bureau, and it should cover all expenses of Government if these are people needing relief.

I would for various reasons keep the advance down to not more than Rs.250 or 300 to each maistry or patel advanced.

I've every belief in some such scheme *with Government assistance.*

It is early to discuss details, but we need action *now.*

I am,

Dear Sir,

Chikmagalur, 1—9—12.

Yours truly,

(Sd.) H. W. RAIKES.

THE CHINA TEA CROP.

The *Daily Telegraph* has received from its special correspondent in Shanghai the following important information in regard to the new crop of China tea:—" The improvement in the political situation," he writes, " has solved the financial difficulties of the tea trade, and there is no reason to except a curtailment of supplies. A surplus rather than a shortage is probable. The first crop supplies are arriving at Hankow normally. Prices in London are 10 and 15 per cent. higher than those of 1911, owing to the advance of sterling exchange. The lowest quotation to date is 5⅔*d.* cost, freight and insurance for good Congou, but a drop in the market is probable. The quality is satisfactory, above the average, and especially free from traces of unsoundness. The crop is scarcely up to the standard of 1911. The spring is rather hot and dry for a first-class crop, but the liquor is strong and pure, with an entire absence of taint or weatheriness, and the leaf should keep well."

THE INDIAN TEA ASSOCIATION, (LONDON).

At the last Annual Meeting of the members of the Indian Tea Association held on the 9th July, 1912.

Mr. W. Skinner, Secretary, submitted

THE ANNUAL REPORT

which stated (*inter alia*) that the quantity of Tea exported from Northern India, *via* Calcutta and Chittagong, between the 1st April, 1911, and 31st March, 1912, amounted to 245,341,948 lbs. against 238,382,478 lbs. for the previous year—an increase of 6,959,470 lbs.

The quantity of Tea exported from Southern India during the same period (1st April, 1911, to 31st March, 1912) was 18,985,168 lbs., as compared with 18,617,708 lbs. in 1910-11, and 16,616,154 lbs. in 1909-10.

The total exports from Northern and Southern India by sea were, therefore:—

1911-1912	... ...	264,327,116 lbs.
1910-1911	... ...	257,000,186 „
1909-1910	... ...	251,852,667 „

In addition to the above, 454,720 lbs. went by rail from Calcutta to Bombay during 1911-12, against 154,323 lbs. in 1910-11.

The Committee is indebted to Mr. Reade, the Principal of H. M. Customs, Statistical Office, for the following statement of the quantities of Tea imported into the United Kingdom from China, British East Indies, Ceylon and other countries, during the calendar year 1911:—

Weight by	China incuding Hongkong and Macao.	British East Indies.	Ceylon.	Other Countries.	Total.
	lbs.	lbs.	lbs.	lbs.	lbs.
Importers ...	24,947,144	188,559,936	110,231,309	27,368,110	351,106,499
Customs (after weighing ...	24,701,844	186,013,336	109,500,881	25,930,353	346,146,414

With regard to the Scientific Department the Calcutta Comittee have carried through negotiations for a site at Tocklai, and considerable progress has been made with the erection of the necessary buildings, which comprise a well-equipped laboratory and two bungalows, one of which will be occupied by Mr. P. H. Carpenter, the Assistant Scientific Officer, and the other by the Entomologist and Mycologist. The Calcutta Committee anticipate that the total cost of the new station will be about half a lakh of rupees, and they hope it will be ready for occupation early this year.

During the past year, two new officers have been sent out to the Department—a Mycologist and an Entomologist.

The question of bidding in one-eighth of a penny at Tea auctions occupied the very careful consideration of the Committee who passed the following resolution:—

" Where *one bulk* is divided, the Buyer's bid of say *7d. and drop* to be accepted as a bid for both lots, and no one else shall have the right to cut him out on the second or drop bid, Anyone, however, may secure the Tea by bidding 7*d*. or higher for both lines.

" The new arrangement would only apply to Teas selling up to a limit of 8½*d*. per lb." This was rejected by the Tea Buyers' Association, who put forward the following reasons in favour of bidding in eighths of a penny at a Conference held to discuss the matter :—

" That the present advance of a farthing per lb. on Tea at say 9*d*., is out of proportion to its value, when compared, with the custom prevailing in other articles of produce, that Tea can be graded in eighths, is valued in eighths, and, therefore, should be bid for in eighths. Thirdly, that in all other markets of the world smaller advances on Tea are a rule and practice of the trade, *viz* : in Calcutta 1/12th of a penny; in Colombo 1/6th of a penny and in Amsterdan 1/12th of a peny. Fourtherly, that over 90 per cent. of the buying power of the trade are strongly in favour of the eighth bid."

The Committee, however, after receiving the report of the three representatives who attended the above mentioned Conference, unanimously resolved that they could not agree to any alteration from ¼*d*. to ⅛*d*. bidding at public auctions of Indian Tea, although they were quite willing to give a trial to their resolution of the 10th July. They also agreed that the new arrangement should supply to Teas selling up to 8¾*d*. per lb., instead of 8½*d*. as originally proposed. This was accepted by the Buyers' Association, and the new system of bidding came into force at the sale of the 22nd January, 1912. Brokers report that it is working quite satisfactorily.

The Committee after very careful consideration came to the conclusion that it was desirable that the Tea Cess should be continued for a further period of five years and they have so advised the Calcutta Committee.

The Chairman, Mr. P. Russel, in moving the adoption of the report first referred to the loss which the Association and the whole planting community of Northern India had sustained in the death of the late Secretary, Sir James Buckingham.

With regard to the Tea Cess, the Chairman said that, the period for which the Cess runs expires on March 31st 1913 and with a view to deciding whether they should advise the continuance of the Cess, the Committee asked Mr. Ashton of Messrs. Shaw, Wallace and Co., to draw up a note explaining the history of the Cess. They were all most grateful to Mr. Ashton the very able manner in which he complied with their requests. After considering this note by Mr. Ashton and talking it over, the Committee came to the conclusion that the continuance of the Cess was desirable, and the requisite steps will now be taken to secure the views of members outside the Committee. Fairly full details are given in the report as to the work done this year. Though little progress has been made in Germany during the past year as compared with 1910, the figures are complicated by the abnormal increase in imports in 1909, prior to the imposition of a duty of 5½*d*. per lb. on tea. On the reduction of the duty to 1½*d*. per lb., which took place in 1906, there was considerable increase in imports of all tea, and a marked advance in the proportion of Indian. Thus in 1905 the total import of tea into Germany was 6⅓ million lbs., of which three-quarters of a million, or 11 per cent., was Indian tea ; while for the three years 1909-11 the average annual import was 8¾ million lbs., of which Indian tea amounted to 1¼ million lbs., or 14 per cent. In Belgium, too, there has been an increase in the use of tea, though, as the returns do not differentiate between Indian and other teas, it is not possible to say what the increase in consumption of Indian tea really is. Still, we should all like to see more rapid progress, and the question of how this may be effected is engaging the attention of the Sub-Committee. There is, however, one point which he thought should be borne in mind, and that is, that it is much easier to increase your export trade or, in other words, the consumption of Indian tea in foreign countries, on a falling market, than it is on a rising market, such as we have had during the last year or so. The advertising compaign in the United Kingdom is being energetically carried on, and he thought we can claim that it works quite successfully. The evidence which we have from grocers all over the country is evidently genuine and shows increasingly good results. (Hear, Hear.)

The agreement with the Conference Liners for Shipment of our teas (the original agreement having expired) was running on under a six months' notice on either side, and during the year the Conference Liners informally brought to our notice the high rates that were ruling for rough cargo and the probability of those rates being maintained. They pointed out that the expenses of shipping companies had increased since the agreement was made, and they expressed a wish to settle the whole matter amicably without giving the formal six months' notice, which they thought would avoid unnecessary and, possibly, long-dram-out discussions. The Committee felt that, although no doubt our previous rate had been a paying one for the shipping companies probably during most of the term of the agreement and the contract with us was a valuable asset to them, still it was true that wages and other expenses had gone up, and the Conference Liners had given us a good and regular service and were now meeting us in a straightforward and, as it seemed to us, a reasonable manner. Accordingly, a new agreement was come to, and from the course events have taken, we do not think we have much reason to regret the arrangement we come to. To that he had to add that the Sub-Committee appointed to go into the question have arranged for the Chittagong freight agreement to be run concurrently with the Calcutta agreement.

Referring to the dock strike which is at present troubling nearly every trade in the City of London. The Chairman said that of course, in our case, fortunately, it has taken place at a time when it causes us the minimum of inconvenience, but, probably, the shipment of our teas from India will be delayed, as so many ships have been hung up in London unable to load. As representing this Association, he attended two meetings, both being held at the Chamber of Commerce, one to endorse the action of the Port of London Authority in widening the licensing system for lightermen and the other to represent to the Home Office the necessity for adequate protection being given to the large number of men who were both anxious and willing to work and were only prevented from doing so by fear of the consequences. (Applause). He thought that these were both subjects that we are all interested in and it was as well to let the name of the Indian Tea Association appear as supporting those movements. (Applause). He would like to say with regard to that subject, that there may be some dislocation in the near future. Probably our teas will come along very slowly for some time and then we will probably have a rush of supplies, so I think it is most necessary for us to keep a watchful eye on things and only supply the trade with such quantities as they can adequately deal with. (Applause.) He thought there was no doubt that these steamers that are held up here will probably all get away at once, or very nearly at the same time ; they will arrive in Calcutta together, and the result will be several ships coming in here with large cargoes of tea at the same time. That is the chief danger ; it seems to me, that we have got to guard against.

Then, touching on the labour question, the report states fairly concisely the point at which we have now arrived. The memorial to the Viceroy has been altered to meet the various opinions expressed in India, and, provided our friends there now approve it, it will, we hope, shortly be presented. The Government of India must recognise that the labour supply for the tea industry is of vital importance, both to that industry and to the new Province of Assam itself, and ihat for years to come that labour will have to be imported. No complaint can be made as to the treatment of the workers on the gardens, and the problem is to hit on the best plan to ensure a smooth inflow of labour into the Province. Government proposes to remove the provisions of Act VI. from the labour districts in Assam, as has already been done in ihe case of the Surma Valley, and at the same time expresses the wish to see the Contractor system under Chapter III. of Act VI. eliminated. Now we, are prepared to cooperate with Government on both these points, but Government must first show us definitely that the disabilities under which we have to work in the recruiting districts at present will be removed, or at any rate considerably lessened. (Applause). Again, it seems to many of us quite illogical that any system of recruitment of indentured labour should be allowed to remain in the recruiting districts if that for Assam in abolished—(hear, hear,)—especially when that labour is required for places outside India itself. (Applause.) The elimination of the Contractor is the most difficult part of the whole question, because unless he is done away with thoroughly our position will probably be worse than it was before. To abolish by notification would, he thought everyone would agree, be no good whatever, and Government will require to take very strong steps indeed to ensure the abolition being effective. Once Government has received our representations, a basis for further negotiations will be opened, as to the effective measures to be taken to safeguard Sardari recruitment in the future, and also as to the protection which may be afforded under the proposed Local Enticement Act, and I think at the same time we can justly claim free access over the whole of India for recruitment by our Sirdars. (Hear, hear).

TEA.

Effect of Nitrogen on Tea.

We have more than once been asked whether nitrate of soda can be used with advantage in tea gardens, but, being without really conclusive data on the point, have not cared to give a definite opinion one way or the other.

We have now received from one of our correspondents in Japan, who has made a special study of the subject, a very interesting statement as to the effects of nitrate of soda on tea in Japan, and, though the conditions there are not quite the same as in India, Ceylon, and China, the general principles may be said to be similar, so should interest growers at all these centres.

In Japan there are only three pickings, and the leaves are not "graded" as in other places where black tea is the product aimed at, all the tea for home consumption in Japan and for export to America being green tea. It must also be remembered that there are spring frosts in Japan, and sometimes considerable damage is done to the first crop by them. In many districts fish manure was the oldfashioned method for supplying nitrogen, but latterly it has been proved that there is a saving in the cost of manuring by the substitution of nitrate of soda for a part of the fish manure; at the same time the nitrate produces an increased yield on the first picking, with no diminution in quality.

It was found, too, that the application of nitrate had some protective influence against frost damage. In regard to the second picking, which is commonly reckoned at not more than 60 per cent. of the first, the inclusion of nitrate of soda increased the yield to as much as 90 per cent. of the first picking.

In practice the amount of nitrate applied is from 250 to 300 lb.s per acre per annum in three or four applicaiions, say, once or twice before the first picking, once after the first picking, and once after the second picking, It would, of course, be impossible to apply these experiences to places like Ceylon and India, where the raw leaves are "graded" and where an indefinite number of pickings take place. At the same time the results obtained in Japan should be of value, in that it seems that an increase of yield is obtained by the use of nitrate without any deterioration of quality. When one thinks of the stimulating effect nitrate has on a plant about to "flush" this is not surprising. It has always seemed to us that, assuming the quality is not affected, small applications of nitrate of soda would be beneficial on tea plantations, say, after each picking. Without personal experience of the climate and a first-hand study of the soils it would, of course, be impossible to go into detail in regard to any particular country or district, but it would be interesting to see the result of a "little and often" treatment with nitrate on a tea plantation, as a top-dressing, in such plaees as Ceylon and India, ofter the use of the usual manures. Whatever is done, however, in the way of general manuring, should be continued. Since nitrate of soda is such a quick acting fertilizer, and is especially valuable in producing young and tender shoots at short notice, its use must prove invaluable for stimulating a "flush" with tea if applied before picking; and it is only reasonable to suppose tfiat tea is one of the crops which would particularly benefit by its use as a top-dressing.

Our Japanese correspondent mentions that he does not find it advisable to apply all his nitrogenous manure in the form of nitrate nitrogen. His experience is that 60 lb. of *nitrogen* per acre (*i. e.*, pure nitrogen) may be safely used on tea, and of this about half should be in the form of nitrate nitrogen and the remainder supplied by fish guano, soya-bean cake, or other nitrogen-yielding manures.

It may not be out of place to conclude by mentioning tho export figures of Japanese tea as stated in the Yokohama Chamber of Commerce Year Book, to show the importance of this industry to Japan :—

Total exports of tea from Yokohama for sevea years:—

	Kin.	Value (stg.) £.
1905	29,155,221	1,058,432
1906	30,021,278	1,076,709
1907	30,684,472	1,261,824
1908	26,662,971	1,115,837
1909	30,741,570	1,315,653
1910	32,946,417	1,454,233
1911	32,187,594	1,437,926

1 kin=601 grammes or about 19 oz.
1 gramme='032 oz. 31½ grm.=1 oz.

Agriculture and Labour in the Federated Malay States.

During the course of a paper read at a meeting of the Royal Colonial Institute on 12th March, as reported in the journal of the Institute Sir Ernest W. Birch, K. C. M. G., when dealing with the subject of agriculture and labour said:—

"A great many forms of agriculture have flourished in Malay States. The chief of these have been tapioca, gambler, pepper, sugar, Liberian coffee, coconuts, rice and rubber. Of these practically only the last three remain, and with the exception of coffee, I do not regret the loss of others. Some day I hope that coffee may be revived.

"The first official mention of rubber in the Malay States is contained in the administration report of Sir Hugh Low for 1883. He wrote: "Specimens of rubber from six-year-old plants of *Heava Braziliensis* in the Government Experimental Gardens have been collected." In various parts of the Federated Malay States there are magnificient old specimen trees to be seen of huge size which will produce upwards of 20 lbs. of latex, but it was not till some ten years later that planters began to turn their attention to the cultivation of Para rubber for commercial purposes. Of recent years the Government has thrown itself heart and soul into the question of assisting the cultivation of rubber. It has established an Agricultural Department with a highly-paid Director, a Mycologist and an Entomologist. It has issued loans to a very large amount which for the most part have been since repaid. It has established a Labour Department to further Indian immigration, and it has listened to the Planters' Associations and brought in regulations dealing with the cultivation of rubber and sale of latex. As a set-off against this assistance it has decreed that all lands granted since 1905 shall after six years bear a quit rent of $4 or 9*s.* 4*d.* per acre, and it levies an export duty ot 2½ per cent. *ad valorem*. The climate with its constant rainfall is ideal for the growth of rubber, the soil for the most part exactly suitable, the road and rail communications of the very best and yet British people, representing large rubber interests in London have unfavourably compared the conditions in British Malaya to those of Dutch possessions in Netherlands India. But the Government of the Malay States is able to adhere to its conditions and meet the requirements of those who will still apply to it for land, and it knows, what others fail to realise that there is a vast amount of work before it in further extending its road system, in constructing branch railways to meet over-increasing centres of poulation, and in making the loan which it has guaranteed to Siam. In 1910 there were 245,000 acres under rubber, and twelve and a quarter million pounds of dry rubber were exported, worth nearly four and a half millions sterling."

(*To be continued.*)

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At the last Annual Meeting Mr. Hughes brought forward aresolution supporting the Karachi Chamber of Commerce in their contention that the money belonging to India would be better employed in building railways and communications in India rather than in being lent at very small interest and even at none at home. Severe and just as Mr. Hughes' comments were, they were mild compared to the article published in *Capital* by Mr. Webb, C.I.E. which is reproduced in these pages. It should be specially noted the secretiveness with which the Home Government has treated this vitally important matter.

The Scientific Officer continues his interesting series of article, and treats of Rubber in Mysore and the colour of Rubber; Bees and Coffee Fertilisers and the Production of Tea in India. A programme of Mr. Frattini's tour of inspection is given which will be of great assistance to Mysore men who will know when and where they will find the Scientific Assistant on given dates.

Under the heading of Coffee, Crops and Supply are dealt with compiled from the Spice Mill, a late telegram from Rio Janiero should be of happy augury to coffee planters as to the continuance of high prices.

Another article is that of Fungus Notes which is interesting.

It may interest readers to know that Mr. Crawford and the Secretary visited Bishop Cotton School and saw little master Claridge who is being educated there and that a good report was given by the masters of the little boy's intelligence and aptitude both for work and games. From that very interesting biography of Lord Macaulay it will be remembered that he always used huge dabs of sealing wax when writing to his nephew at Harrow, and told him that the most important part of his uncle's letter lay under the seal, which on being melted down revealed the ever aecceptable sovereign. Mr. Crawford very kindly uncleized himseif on the occasion of the visit.

Several members of different Associations have called at the Office during the course of the month. Messrs. Crawford, Scholfield, Clode, Parton, Boyd, Brock, Scott, Brown Pére at fils. Adventures are to the adventurous and Mr. Scholfield will long remember his first ride on a motor bike in Madras, getting on without knowing how to manage the motor, With magnificent courage, he started on his journey which continued till the petrol ran out, which was several hours after his start, and after having covered some three hundred miles round the Island. A record and a ride almost as memorable as that of John Gilpin.

THE SCIENTIFIC DEPARTMENT, U.P.A.S.I.

Hevea and Ceará Rubber in Mysore.—There is a good deal of Ceará Rubber in Mysore in one place and another and it is growing very well. It is not a district which is usually considered suitable for Hevea, however, being too high and too dry as a rule. Despite this some Hevea is making good growth and has reached the tapping stage. At the recent Exhibition in connection with the Annual Meeting of the U. P. A. S. I., Mr. C. H. Browne exhibited some Hevea biscuits which were of the greatest interest since they were samples of the first Hevea Rubber which has been grown and manufactured in Mysore and actually sold in the London market, where they got a good report, and what is better still for the practical side of the question, high prices.

Some excellent Ceará biscuits were also exhibited and samples of a lot sold at the same time. Mr. Browne has kindly allowed me to reproduce the Reports on this rubber received from Messrs. Sanderson & Co., and from Davitt. Messrs Sanderson & Co., reported as follows, and valuedthe Hevea at 5*s*. 4*d*. per pound and the Ceará at 5*s*. 2*d*. per pound :—

"There is nothing to choose between these two samples as far as preparation is concerned, the Ceará sample is decidedly resinous, and for this reason will not fetch as much as the Hevea sample. The preparation in both cases is extremely satisfactory, and both samples would fetch full market price for the description. No doubt as the trees grow older the proportion of resin in the Ceará sample would be less."

Devitt's report on the Hevea is "both samples are well up to fair average quality and compare very favourably with the best Ceylon biscuits," and on the Ceará, "Fine clean pale amber Ceará biscuits, well prepared and in good condition. Rather less resin than usual. Quality above the average of this grade. Value about 5*s*. 1*d*. 5*s*. 2*d*. per pound."

Colour of Rubber.—*The India Rubber Journal* of August 17 publishes two letters from Manufacturers of Rubber agreeing with the contention of that paper that Rubber should not be judged by its colour. "Dark rubbers which are now rejected are as good as, if not better than, lighter coloured kinds for many purposes," and, "colour is no indication by itself of the quality of the rubber" says one Firm who always buy big samples and make their price from "the appearance and toughness" of the sample submitted to them.

The second letter states that, "the question of colour scarcely ever enters into our consideration at all in judging the quality of Plantation Pará, in fact we should be chary of accepting rubber which was particularly pale until we had thoroughly examined it."

Bees and Coffee Fertilisation—This subject was again raised by the Shevaroy Delegate at the Annual Meeting of the U. P. A. S. I. Last year the Government of Madras took the matter up and their Entomologist, Mr. T. Bainbrigge-Fletcher, was instructed to investigate. However, unfortunately the request came too late as all the Coffee blossom was over. It was decided to remind the Madras Government again this year and ask that the Entomologist might be allowed to study the subject. It appears, however, that it has not been forgotten, and it is possible that Mr. Fletcher will be able to pay a visit to the Districts more especially interested before the end of this year. This is advisable in order that he may be able to get an idea of the conditions prevailing on the Coffee estates and make plans for the carrying out of certain necessary experiments. As the coffee is in blossom for such a short time a plan of action should be decided upon sometime beforehand.

A reference to the Chronicle, Vol. VII. p. 419. will show the comments made upon the subject by the Government of Madras. It is there stated that " it has by no means been proved that bees are essential for the pollination of coffee." This is not quite the point that is of importance. Coffee can be self-fertilised, and there is little doubt that in some cases it is largely self-fertilised, and so bees are not " essential." But it is thought by some planters that self-fertilised coffee is not of such good quality as insect fertilised coffee, and that the great reduction in the number of bees in some districts, owing to their indiscriminate slaughter by native honey and wax collectors may be one of the factors playing a part in the much talked about deterioration of the quality of South India coffee. The effect of the reduction in the numbers of bees in coffee districts on the *quality* of the coffee, as well as on the actual quantity, is a point which needs investigattion, and it is to be hoped that Mr. Fletcher will be able to throw some light into the present dark places and tell us how to improve the conditions with, or without, the help of Government."

Production of Tea in India.—A note on this subject prepared in the Office of the Director General of Commercial Intelligence has been received giving a number of very interesting statistics brought up to the year 1911. Returns have been collected from a total of 574,575 acres for the whole of India, of which 20.593 acres are credited to the Madras Presidency and 32,008 acres to Cochin and Travancore, though the returns from Cochin appear to be very incomplete. The production for 1911 is recorded as 268,823.436 lbs. for the whole of India, of which the Madras Presidency contributed, 5,795,407 lbs., and Cochin and Travancore 14,714,537 lbs. 1,601,911 lbs. of Green Tea are reported as having been produced in South India in 1911. It is interesting to note, as throwing some light on the consumption of tea in India, that during 1911-12 the balance between production and export was 15,515,552 lbs. It is pointed out that " the figures of productlon are far from accurate and consequently any estimate of the consumption *per capita* in India as a whole is vitiated at the outset." The prices of tea show a substantial increase as compared with the prices of the preceding year ; the average price of Broken Pekoe during 1911 is given as 7 as. 9 p., of Pekoe, 7 as. 7 p., and of Pekoe Suchong 6 as. 9 p. The number of persons employed in the Indian Tea Industry in 1911 is returned at 526,460 permanently employed, and 87,502 temporarily employed, while the capital of joint stock companies engaged in the production of tea amounts to over seventeen million pounds sterling.

Scientific Assistant for Mysore.— Mr. Frattini who is making a tour of inspection in South Mysore will carry out the following programme as closely as possible :—

15th	September	Barehunhulla	Estate.
20th	„	Hooli Hundloo	„
21-26th	„	Chickanhully	„
27th	„	Lingapur	„
28-30th	„	Baithney	„
1-3rd	October	Soondhully	„
4-6th	„	Oossoor	„
7-8th	„	Bargnai	„
9-10th	„	Ubban	„
11 to 13th	„	Karradi Betta	„
15th	„	Bettadmane	„

R. D. A.

INDIA OFFICE FINANCE.

By M. De P. Webb, C. I. E.

The recent debate in Parliament on the Indian Budget is remarkable for two reasons, firstly, to all appearances, almost everything under the sun was discussed at length except the Indian Budget; and secondly, the debate was closured at 11 p.m., thus putting an end for the time being to the possibility of any awkward charges of mismanagement or misapplication of public moneys being pressed home against the officials of the India office. I wonder if an Indian Budget debate has ever been closured before?

When introducing his figures, Mr. Samuel Montagu was most careful to avoid any reference to such strange matters as the holding of £8,000,000 cash *in London* against a Paper Currency that only circulates and is only redeemable *in India*. Mr. Montagu was similarly secretive with regard to the colossal cash balance of over £18,300,000 which the India Office held on the 31st of March last and which, in the absence of any need for the money on India's account, had been lent out secretly to various concerns in London, *in many cases without security* and at such miserably low rates as two-and-a-half per cent. Nor did he lay any stress on the fact that the securities in which the Secretary of State has invested practically the whole of the Gold Standard Reserve have already depreciated in value to the extent of over a million sterling—that they will in all probability shrink in value to the extent of another million or so—and that the whole £18,000,000 would be altogether unsaleable in the event of a great war or a great financial crisis, and consequently in a large measure worthless to India, possibly at the very moment when India most urgently needed them. These are litttle trifles, however, which it would perhaps be unreasonable to expect an Under-Secretary of State to touch upon when he was merely handling the Indian Budget.

I have remarked that the figures and details of the Budget were "to all appearances" neglected. As a matter of fact, in this case appearances were deceptive. One Member of the House, Colonel C. E. Yate, in the course of his speech propounded five extremely pointed questions in connection with the India Office's mismanagement of India's cash balances and reserves. Four out of these five questions have been carefully suppressed not only by the London financial press, but by all the London newspapers, including, alas, the great *Times* itself. Possibly the secret manipulation in London of £10/20,000.000 of India's spare cash by undisclosed borrowers at the expense and to the loss of the Indian tax-payer, is not a matter to which London newspapers think it desirable to make any reference. Be this as it may, the peoples of India are not likely to allow the incident to pass unnoticed. Here is the gist of Colonel Yate's enquiries:—

(1.) What is the reason that the cash balances held in London on behalf of the Government of India have steadily increased *every year* from £4,600,000 in 1907 to over £18,000,000 in 1912?

(2.) Why does the Secretary of State decline to give the names of the individuals to whom £10,000,000 of Indian money has been secretly lent in London? The money is public money and not the private property of the Secretary of State.

(3.) Why does the Secretary of State lend out India's millions without security in London at about two-and-a-half per cent. and at the same timborrow back the money on behalf of the Government of India at three-and-a-half per cent ?

(4.) Why, when the Secretary of State's requirements in London according to his budget are only £16/17,000,000 per annum, does he withdraw from India £26/27,000,000 per annum ?

(5.) Why, when the Indian Currency Committee recommended that the Gold Reserve should be held *in gold*, does the Under-Secretary of State announce explicitly in a Parliamentary Paper printed for the information and instruction of Members of both Houses, that the Indian Currency Committee recommended that the reserve should be held *mainly in securities.*

To no single one of the above five questions did Mr. Montagu return a straight answer. Indeed, to questions (2), (3), and (5) he attempted no answer at all. In such circumstances the India Office must not feel surprised if the public attach the worst possible construction on the incident. With regard to Colonel Yate's first enquiry as to the reason of the steady increase *year by year during the last five years* of the cash balance (from £4,000,000 to £18,000,000) retained by the India Office in London, Mr. Montagu admitted that the balance of £18,300,000 *this year* was a matter for comment. It was, however, so he explained, 'only a part of the whole amount standing to the credit of the Government of India.' The reason of the magnitude of the figure was 'over-estimating and under-spending in certain departments and the great volume of trade done between England and India.' Mr: Montagu added (no doubt with reference to Colonel Yate's enquiry No. 4), that 'the Secretary of State had in view only one object —the facilitating of trade, *which would be brought practically to a standstill if Council Bills were not ivsued.*' A few minutes later, and whilst Sir John Rees was in the middle of his remarks, Mr, Montagu moved the closure!

What are we to say to replies such as these, solemnly put forward by a responsible official as answers to serious questions regarding the India Office's management of India's finances ? The idea of informing Parliament, *as though the fact were some palliation of the scandal*, that the colossal cash balance (over £18,000,000) was 'ONLY A PART' of what the India Office held on account of the Government of India, would surely have occurred to nobody but Mr. Samuel Montagu. (The assertion is, of course, quite true. The India Office at present holds close upon £40,000,000 of India's money altogether, including Paper Currency and Gold Standard Reserves). Then again, "over-estimating and under-spending" to a degree that leaves the larger part of twenty millions sterling in the hands of the India Office is hardly a matter to be proud of. On the contrary it is the severest condemnation of the present Indian Office Budget makers that has yet been offered to the public. The climax of Mr. Montagu's efforts, however, is to be found in the last words of explanation that he put forth, namely, that the trade of India would be brought "practically to a standstill," unless the Secretary of State sold £26,000,000 of Council Drafts per annum (instead of the £16,000,000). For sheer ignorance of brazen impudence—no other alternatives are possible—this assertion certainly "takes the biscuit." Just fancy the High Commissioner for Canada (or Australia or South Africa) seriously informing the public that unless he transferred State funds, *of which he himself had no official need*, from Canada to London, at the bidding of certain private banks and others, *and at a lower cost to the banks than they themselves could ship the money*, the trade of Canada would be brought "practically to a standstill!"

One only needs to examine the suggestion for a single second to perceive the falseness and crass absurdity of Mr. Montagu's remark. The whole idea is too preposterous to merit a moment's discussion. At the same time, the fach that such rubbish should proceed from the mouth of an Under-Secretary of State for India in a solemn debate in Parliament on Indian affairs is a depressing sign of the times. It seems to indicate that poor India has little chance of fair play at the hands of some of the present financial "advisers" of the India Office.

The fact is that any effort to explain away the scandal only drives Mr. Samuel Montagu and the India Office deeper into the mire. *Qui s'excuse, s'accuse*, so a combined effort is now being made in Parliament and the London Press to hush up the whole matter by suppressing all references to the subject. The effect will fail. The public in India are at last understanding the bearings of the problem and are calling for justice and fairplay for India. The directions in which reform should now proceed may be summarised as under :—

(1.) Taxation in India which was, and is still, in excess of current requirements, should be at once lightened.

(2.) The present colossal cash surpluses (over £12,000,000 in India and over £18,000,000 in London) that have arisen from unduly heavy taxation, and from "over-estimating and under-spending," should be utilised forthwith *in India* and *for the benefit of India*, and not, as at present, in London mainly for the benefit of certain favoured Banks and Finance Houses who have little or nothing to do with India.

(3.) The India Office which, according to Mr. Hartley Withers, the City Editor of the *Times*, has in recent years become one of the greatest money-lending concerns in the world (*vide his "Meaning of Money"*), must at once cease this secret money-lending business with public money and must confine its financial activities to India's actual needs in London, and not to the bolstering up the businesses of London's Joint Stock Banks and other London financial enterprises.

There are, of course, other reforms that are essential before India's currency and finances can be restored to order and decency. These may be dealt with on another occasion. Enough has been written now, perhaps, to indicate that the gross mismanagement and scandalous misapplication of public money that has characterised the regime of the Finance Committee of the India Office in recent years, are not likely any longer to pass unchallenged, notwithstanding the efforts of Mr. Samuel Montagu, aided by the London Press, to conceal the mess from the public eye.—*Capital.*

Rubber planters in Burma are still in suspense as to what the Local Government propose to do about altering land tenure. Writes the Burma correspondent of *Capital* a few months ago the Lower Burma Planters' Association took united action in approaching Government on the subject. The present conditions of land tenure in Burma for rubber cultivation are eight years' free tenure, afterwards a rent per acre of any amount up to a maximum of Rs.25 per acre. That Association have suggested to the Goverument of Burma a scheme at the of rate Rs.3 per annum and 2½ per cent. *ad valorem* duts. His Honour Sir Harvey Adamson would do well to give in to the Association and allow future leases on this basis and have the old leases altered to correspond. The rent ***must*** be fixed at a definite rate and done so quickly. Surely two years is a sufficient period for the Local Government to decide whether the rules should not be altered. The fear that a land revenue of Rs.25 per acre may be imposed is exercising a most detrimental effect on the extension of the rubber industry in this Province by frightening away capital from the country.

TEA.

Labour.

"On the estates of the Federated Malay States—chiefly, of course, rubber—there are employed 95,000 natives of India; 40,000 Chinese; 23,000 Malays, of whom half are Javanese. Sir William Taylor, who has taken keen interest in the immigration of natives of India and to whom the success of the organisation of it is largely due, has kindly described it for me as follows:

Systematic recruiting in India of labour for the Federated Malay States is permitted by the Government of India in the Presidency of Madras only. To facilitate the introduction of this labour a weekly service each way, in large and well-found steamers specially adapted for the purpose, is maintained by the British India Steam Navigation Company under contract with, and subsidised by the Government. Depôts are kept up at Madras and Negapatam for the accommodation of labourers waiting to embark for the Malay Peninsula, a European Superintendent with a sufficient staff being in charge at each place. Native agents are stationed in all districts of the Madras Presidency to assist in recruiting labour.

"Depôts are maintained at Penang and Port Swettenham, the ports of disembarkation for the accommodation of labourers on arrival and before proceeding to estates. An Indian Immigration Department, with headquarters at Penang, looks after immigration and controls arrangements both in India and the Malay Peninsula. The cost of the passage of labourers from South India to the Malay Peninsula is defrayed from a Fund known as the Immigration Fund into which the proceeds of an assessment levied on all employers of Tamil labour is paid. This assessment is paid by Government departments as well as by private employers, and is calculated upon the number of days' work done for each employer by his Tamil labourers. Employers desiring to increase their labour force by recruiting from India obtain from the Immigration Department licences for some of the most capable of their Tamil labourers whom they send over to Southern India. The licences provide that the labourers recruited thereunder shall be introduced into the Federated Malay States free of debt and that the cost of their bringing over shall not be charged against them. An estate on which the health is good and the management popular can obtain in this way large numbers of labourers at a cheap rate. It should be noted that no Indian labourers are now recruited under indenture, and all are at liberty at any time to leave their employment on a month's notice.

"Estates on which Indian labour is employed are visted at frequent intervals by the officers of the Immigration Department with a view to seeing that the provisions of "Indian Immigration Enactment" for the preservation of the health and welfare of the labourers are being observed. It is the duty of these officers to see that the labourers are healthy and well cared for, that their house accommodation is sufficient and proper, that there is a sufficient supply of wholesome water, that the sanitary arrangements are sufficient and proper, that provision is made for the medical attendance of the sick, that a sufficient quantity of medicine of good quality is provided, and that suitable and sufficient hospital accommodation is available. The enactments dealing with the subject further provide that in the event of estates or localities where Indian labourers are employed being found unsuitable or unfit for their residence or employment the further employment of labourers in such places may be prohibited.

COFFEE.

Crops and Supply.

The information in this article has been largely compiled from the August number of *The Spice Mill*, to which interesting paper full acknowledgements are due.

The 1911-12 coffee crop amounted to nearly seventeen and a half million bags (17,453,000) of which Rio and Santos contributed about twelve and a half million bags. Of this crop a little over seventeen million bags were delivered by the beginning of last July and the world's visible supply of coffee on 1st August 1912 was eleven million bags (11,031,983), very little more than it was on a similar date last year (10,884,862).

The consumption of coffee in America, which claims to be the largest user of this commodity, is on the increase, and the price is correspondingly rising.

The above quoted authority states that the British Consul at Sao Paulo in Brazil reports as follows on the prospects of the coming crop. " Predictions have appeared lately in the foreign press to the effect that the Sao Paulo coffee crop for 1912-13 will be exceptionally large, and that, consequently, the market value of the commodity is bound to decline heavily. In this case the wish is assuredly father to the thought. There exist at the present time no data upon which to base a reliable calculation as to the size of the coming coffee crop in this State. One important fact, however, must be borne in mind in this connection, namely, that during the month of August last year the coffee districts throughout the State were subjected to the very unusual experience of a spell of sharp frost. It is the opinion of experienced planters at Sao Paulo that the result of such visitation is to diminish, in marked degree, the productive power of the coffee shrubs not only during the season immediately following upon the frost but during the next following season also. The general opinion held in Sao Paulo is that the coming crop will not greatly exceed nine million bags."

In Java the Government Coffee crop has been estimated for this year at 7,344,000 pounds, the crop for several proceeding years having been four to four and a half million pounds. In Columbia a prolonged dry season, and a plague of locusts, render it probable that the coming coffee crop will be considerably reduced. In Nicaragua there are said to be about 70,000 acres of coffee, holding twenty-eight million trees, five million of which are young and not yet in bearing. Good prospects obtained this year, but heavy rain on the open blossom did a great deal of damage, and the crop is estimated at about half the usual amount.

All this tends to show that prices are likely to rule high this year, and the market to be a good one.

The following telegrams dated 10th September appeared the other day for the Indian Papers :—

" A message to the *Times* from Rio de Janeiro states that frost has severely damaged flowering coffee in many districts. It is yet too early to judge of the effects on the growing crop, but high prices are practically certain.

R. D. A.

FUNGUS NOTES.

Gummosis of Prunus and Citrus.

An interesting paper by O. Butler was published a short time ago in the *Annals of Botany*, Vol. XXV, No. XCVII, p. 107, under the title: 'A Study on Gummosis of Prunus and Citrus, with observations on Squamosis and Exanthema of the Citrus.' It is proposed in this article to give some account of the results arrived at in Butler's paper so far as gummosis is concerned, and to leave the consideration of that part dealing with squamosis and exanthema for a subsequent article.

Distribution and History.—Gummosis of Prunus and Citrus occurs in France, Germany, Great Britain, Italy, Portugal, Spain and America, as well as in Sicily, the Azores, and in India. The disease has never assumed serious proportions on Prunus but has been responsible for a large amount of damage in the case of Citrus. In St. Michael, in the Azores, it first appeared in 1834, and was at its height in 1840, when it caused the destruction of a large proportion of the citrus trees of the island. By the year 1873 it was no longer feared, though it still occurred. It subsequently made its appearance in Portugal, Sicily, Spain Corsica and Algeria. It seriously affected the groves of New South Wales between 1860 and 1870, and appeared in California in 1875, in Florida, in 1876.

Description.—The first external signs of the disease are the occurrence of raised places on the epidermis or of drops of gum on its surface. As the disease progresses, the swollen spots on the epidermis burst and allow the gum to flow out, while in those cases where the first sign was the occurrence of small drops on the surface, the progress of the disease simply increases the flow of gum. At the stage when gum has appeared on the surface of the bark, the inner bark, or cortex, will be found to be permeated to a greater or less extent. The infiltrated bark subsequently dies, cracks, curls and sloughs off. Severe cases of gummosis are always accompanied by chlorosis, that is the disappearance of the green colouring matter of the plant, whose green parts become yellow ; this probably results from a decrease in the absorption of mineral nutriment by the roots, brought about by the partial destruction of the bark which entails a partial starvation of the roots as regards the food-supply from the leaves. On cutting a slightly affected branch, two or more years old, through a diseased area, it will be found that the damage first arises in the young wood which has just been formed by the cambium. "The diseased area is fusoid in form from the greater development of the diseased tissues near the point of gum accumulation and their lesser and lesser development as one proceeds further away. The gum exudes *en masse* from the centre of the sickle, but as one proceeds towards its extremities it will appear in droplets of decreasing magnitude and separated with larger intervening spaces of apparently healthy tissue. The gum in the centre of the sickle is more or less tinted yellow, depending on its age, whereas that pearling from the tissues at its extremities is always colourless.

" If sections are now cut at various distances above or below the centre of disease, it will be found that gum formation proceeds downward to a much less extent than upward. Further-more, if we imagine a line drawn through the middle of the pathognomic tissues, it will be found, as one proceeds upwards and downwards, that tne gumming sickle diminishes in size.'

Gumming may attack the stems, small branches, leaves or fruit, and may affect the tree locally or generally, according to external circumstances and the species attacked. It may arise autogeneously, that is to say, without direct outside cause, or may be induced by the attacks of insects or fungi, or by any other form of damage such as may result from wounds caused accidentally by instruments or brought about by frost, sunburn, or the application of acids and poisons.

As has been stated already, the gum pockets may be formed among the embryonic cells of the xylem (the cells of the wood that have been formed most recently from the cambium). The cell walls of this tissue swell up and give rise to the gum. This breaking down of the cell wall may proceed until all its layers are disorganized, when the cell contents become mixed with the gum; or it may be arrested when only the two outer layers of the walls of certain of the cells have broken down, so that freed cells contained by the third layer are left floating in the gum. In mild cases this disorganization is confined to the embryonic xylem cells, but in more serious attacks it may extend to the cambium, the medullary rays, and the older cells of the xylem. When gummosis is arrested, the young xylem cells become lignified (provided with woody walls), and the cambium proceeds to lay down normal tissue so that the gum pockets are enclosed in healthy wood.

Cause.—For an outbreak of the disease the simultaneous occurrence of two factors is necessary, namely, active growth and a free supply of moisture. Butler believes that the formation of gum is due to the hydrolysis of the cell walls of the young xylem. Exactly how this is brought about is uncertain, but he is inclined to think that it is not due to the action of an enzyme. He puts forward good reasons for believing that gumming is not produced by the oxidation of the cell walls, nor by the direct action of a cellulose-dissolving enzyme: two theories which have been suggested by previous writers.

It will be seen from this that gumming is likely to occur when trees are grown in heavy, badly drained soils, or in suitable soils underlaid by an impermeable subsoil. Furthermore, it may be encouraged by excessive irrigation, or by high fertility of the soil combined with want of drainage or excessive irrigation; or by the too great application of manures, especially of nitrogenous manures; and, lastly, by continuous wet weather at the commencement of the growing period. These factors may either induce the disease or encourage its development on wounded trees or on those attacked by insects or fungi.

Preventive and Remedial Measures.—When the disease is traceable to wounds, or to the action of insects or fungi, preventive and remedial measures must deal with these agencies, and need not be discussed at length here. Preventive measures in the case of autogenous outbreaks of the disease should aim at attention to drainage, irrigation, manuring. The use of resistant stocks and of high budding also possesses a preventive effect. The maximum resistance is exhibited by *Citrus trifoliata* and *C. amara*, the bitter orange. The rough lemon, shaddock, orange and citron exhibit intermediate resistance in the order given; while the lemon is highly susceptible. Applications of salt at the rate of from 2 lbs. to 3 lbs. per tree are suggested as being likely to prove of value in preventing gumming. Certain other minor preventive measures are also mentioned.

The most important remedial measure is attention to drainage. Slitting of the bark, crosswise, longitudinally, or spirally, gives some alleviation when trees are subject to gummosis irregularly or accidentally. The excision of all tissues affected, both bark and wood infiltrated the gum, cannot be recommended; excision should be confined to the dead bark only.

Exanthema and Squamosis of Citrus.

The following article contains in a condensed form the information given by O. Butler on these two diseases in his paper in *The Annals of Botany*, Vol. XXV, p. 107. It may be looked upon as a continuation of the article on Gummosis.

Symtoms of Exanthema.—This disease is at present only known in the United States, where it affects all varieties of citrus of all ages that are growing on dry permeable soils or an light soils overlying an impermeable subsoil. The parts characteristically affected are the small branches, shoots, and occasionally the fruits. Frequently, the definite symtoms are preceded by a luxuriant growth and dark colour of the foliage, and by the presence of thick-skinned fruit. Then the shoots become more or less stained beneath the epidermis by a yellowish-brown substance, and begin to die back. If this symtom is not observed, another conclusive indication is that the fruit becomes stained and its epidermis is so hardened that it cracks and splits on account of the pressure of the growing pulp cells. In more advanced stages of the disease the young shoots swell at the nodes—occasionally also at the internodes as the shoots grow older; in some cases the pustules may alternate with nodal swellings. On the older branches nodal swellings are not produced, but the pustules may become very numerous and a small amount of gum may be observed in them. Gum may also exude through the bark in small amounts. When swellings and pustules are not formed on the shoots and branches, an excessive number of buds may be produced which may develop into short branches with yellow foliage; so that a witches' broom effect is brought about.

Cross sections of the diseased shoots show that the swellings are due to an accumulation of gum formed from the young xylem cells, as in gummosis ; that the pustules are caused by excessive growth of the cortical tissues accompanied by a sickle-shaped patch of young xylem containing gum pockets ; and that the rings of growth are well marked and are too numerous to be considered as variations in growth due to seasonal changes. The malady is very similar to gummosis, and is only differentiated from it by the occurrence of the erumpent pustules. These are possibly caused by the circumstances that the epidermis first becomes inelastic and checks normal growth and then bursts ; after this vigorous or excessive growth recommences.

Cause of Exanthema.—This disease is so similar in most respects to gummosis that its occurrence is in all probability dependent on the same conditions, namely vigorous growth coinciding with an abundant supply of moisture. At the same time the abnormally large number of rings of growth indicates clearly that there has been a fairly rapid alternation of favourable and unfavourable conditions for development. This might be brought about by a quick alternation of climatic conditions, or by frequently recurring changes in the available supply of water. The last is clearly the cause in this case. The light soils on which plants with the disease are found become readily saturated with water, which they as readily lose.

It has been discovered that excessive applications of organic nitrogenous manures increase the severity of exanthema, in Florida ; while inorganic manures have a less marked effect. Butler suggests that this is due to the fact that nitrogenous manures stimulate growth, and that organic manures in which the nitrogen is only rendered available by the process of nitrification are only so altered when the soil is sufficiently damp. Thus the growth stimulus due to the nitrogen takes effect at the very time when an ample supply of water is available and when the presence of that water has already induced a vigorous growth in the trees.

Cultivation is another factor that increases the susceptibility of citrus to the disease. Swingle aud Webber suggest that this is because the surface roots are destroyed and the remainder are forced to grow down into an unsuitable subsoil. Butler believes, however, that this is not the true explanation, but that cultivation increases nitrification, particularly in humid climates, while it prevents excessive evaporation from the soil.

Remedial Measures.—The object to be aimed at in preventing or remedying the disease is to produce a uniformity in the water and in the nitrogen-supply, which will give rise to regular, and not to fluctuating, growth. Thus drainage, especially on soil overlying an impermeable layer, is a matter of importance, as is the correct regulation of irrigation water where irrigation is necessary. Care should be taken to increase the humus content of light soils, and applications of nitrogenous manures should be carefully regulated. Heavy fertilisation with phosphatic and potassic manures is also frequently found to be useful, as these have a restraining influence on growth. It may also be desirable to discontinue excessive cultivation, especially in soils underlain by an impermeable subsoil; and merely to apply mulches of different kinds to the soil, according to the material available.

Symptoms of Squamosis.—This is at present limited in distribution to Florida and Southern California, and is a disease confined to the orange tree. The conditions which favour its occurrence are prevalent only infrequently, so that the disease is rare; moreover it develops extremely slowly on affected trees. The chief characteristic is a sealing of the bark which may occur on the limbs or on the trunk, where it first appears as a single scale or group of scales. When the attack commences on the trunk or main limbs, the leaves do not turn yellow until much later and the tree may live for fifteen or twenty years. In fact in these instances, an attack is often hard to identify, as scaling of the bark may arise from other causes, while there are no indications of disease in the foliage and there is no definite correlation with environmental conditions.

Squamosis commences as a rounded or an irregular sloughing of the bark about an inch or somewhat less in diameter. The detached bark soon dies and curls more or less. This curling reveals the underlying cortical tissues which are warty, white, or white with a yellow tinge, and somewhat mealy. When a piece of bark falls, a pustule will be found beneath it; this pustule has a depression in the middle, from which gum frequently oozes. In some cases the pustular out-growth becomes less prominent, especially in advanced cases, and is replaced by a general swelling of the cortex lying below the epidermis. This causes the bark to flake off in large strips. On shoots and water sprouts, shield-shaped, raised spots are formed which are discoloured beneath the epidermis. These become hard, and the epidermis ruptures round their margins. In more serious attacks the spots are larger and less definite in outline. Cracks parallel to the axis of the shoot occur in them, and the disease producing tissues from distinct swellings on the shoots.—*Agricultural News.*

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Scientific Officer's Papers.

CIX.—PREVENTION OF THE INTRODUCTION OF INSECT PESTS AND FUNGOID DISEASES OF PLANTS.

Some of the most destructive pests and diseases known in Agriculture are those which have been transported from their native locality to other regions on, or with, their food plant. Insect pests are likely to be much more destructive when they are transported to new localities for several reasons. In their native environment they are very often controlled by natural enemies, but in the new locality these natural enemies may be absent, while climatic and other conditions may also suit them better.

The danger of the introduction into India of insect pests through the importation of plants for foreign countries is a very serious one, and becomes more serious each year as the communication and trade with other portions of the world becomes larger, and more rapid.

Lefroy states that of the destructive species of Scale Insects in India two-thirds have been introduced. The Green Bug (*Lecanium viride*) which has done so much harm to the coffee in the Nilgiris, and elsewhere, was originally imported from Ceylon. The danger of importing a destructive scale insect on Tea is considerable; no rubber plants should be imported into India without due precautions.

Any scheme for controlling insect and fungoid pests in India must be considered under three heads. First the prevention of the introduction of new diseases from any place outside the country. Second to control the spreading of pests which have already been introduced, but which are confined to certain localities, by preventing their introduction into new localities in the country. Thirdly to deal with the existing pests in those localities where they exist.

The subject of preventing, or at least controlling the introduction of pests and diseases by the importation of plants is one which has been grappled with in most countries where agricultural industries are large and important. In the United States nursery-men are prohibited from sending out plants on which insect pests are present, and a process of fumigation is adopted as a matter of ordinary daily routine. The United States, the West Indies, Cape Colony, Australia, Ceylon, and many European countries, have introduced legislation to protect themselves against the importation of plant diseases.

These countries have adopted legislation which in the first place regulates the importation of plants, secondly treats all imported plants on arrival at the ports of entry, and lastly provides for quarantine and inspection of plants after their arrival if necessary.

Fungoid diseases need different treatment to insect pests and are harder to deal with, as often the fungus cannot be destroyed by any treatment. Therefore plants and plant material on which any serious fungus disease is present should not be admitted into any country where that disease does not exist, and such plants should be destroyed at the port of entry. Again, plants coming from a country or locality in which they are subject to any serious fungoid disease should not be admitted into any country where that disease does not exist. A good.example of an instance where such a precaution should be adopted is the case of the witch broon disease of Cacao in Surinam, a fungoid disease somewhat similar to the Sandalwood disease in this country. No Cacao—growing country should import cacao plants from Surinam for fear of introducing this disease, and in fact most Cacao—growing countries prohibit by law such importation.

In the case of fungi which are not so serious in their effects it is not necessary to prohibit importation, but merely to free the imported plants from spores and mycelium actually on them. For this purpose they should be treated on arrival at the port of entry with Bordeaux Mixture, Corrosive Sublimate, or some other suitable fungicide, before they are delivered to the importer. This is the process adopted in many countries with imported sugarcane plants, pine-apple suckers, cotton seed for planting, and so on, and it is the process which should be adopted with Tea seed imported into this country, or from one district to another in the country.

Insect pests are more easily killed and their importation more easily controlled. Scale Insects should be especially guarded against. To prevent the importation of insect pests a process of fumigation of imported plants on their arrival at the port of entry with hydrocyanic gas is now adopted in most agricultural countries.

The first law dealing with the subject in the West Indies was made in Jamaica in 1884; this was amended in 1891, and under these laws all plants introduced into Jamaica are now fumigated. In 1890 Trinidad followed suit with a law prohibiting the importation of diseased sugarcanes and the scope of the law was widened in 1894. During the years 1895 to 1908 all the other West Indian Islands passed laws making it possible to prohibit the importation of plants from certain places, and since 1908 laws have been passed in all these Colonies making provision for the introduction of plants under conditions which, as far as possible, reduce the risk of introducing new pests and diseases. As mentioned above many European countries, the United States, and most of the British Colonies now have similar legislation, and the matter is at present under consideration for India. (See *Planters' Chronicle*, Vol. V., p. 504).

The legislation adopted in the West Indies at the advice of the Imperial Department of Agriculture makes provisions under the following heads. First total prohibition; second destruction of badly infested plants on arrival; third, treatment of plants on arrival to kill pests or diseases which may be known or suspected to be on them; and fourth, inspection of suspected plants from time to time for a certain period with power to destroy such plants if they are found within that time to be affected with any serious pest or disease.

The law adopted by Grenada is a good example of such legislation. Under this law the Governor can by proclamation prohibit, or restrict, the importation of any particular seeds or plants from any particular country or place if necessary. Cacao plants from Surinam were prohibited on account of the witch broom disease for instance. In Cape Colony and Natal the Importation of coffee plants from India and Ceylon was at one time, and probably is now, prohibited on account of leaf disease.

The Governor in the same way has power to proclaim that any, or all, imported seeds and plants shall be subjected to a process of disinfection at the port of entry. This proclamation was made and all imported plants are disinfected at the Government expense by the Agricultural Officer in charge of the Botanic Station at Grenada.

This Agricultural Officer, who is usually a Botanist, Entomologist, or Mycologist, and in any case an an important European officer of the Agricultural Department, has power to destroy a consignment of plants if he considers it necessary. He also has power to inspect imported plants after they have been delivered to the importer. In practice the former power was seldom exerted, but it was a very necessary one in the case of certain fungoid diseases; the latter power was useful in some cases to insure that a batch of diseased plants had been freed, from scales for instance, by fumigation.

The Agricultural Officer also had powers of discretion given to him, and was allowed to pass certain consignments of plants and seeds without disinfection if he considered that it was safe to do so. For instance garden and vegetable seeds imported from well known Firms, and packed in air tight cases, or sealed packages, were not disinfected.

In practice this law worked well and smoothly, and fumigation was found to be cheap, easy, and effective. In a small island like Grenada with few ports it was naturally much easier to work such laws than it would be in a country like India, with an immense sea board and numbers of Native States. Still, even in India, the difficulties are probably not insuperable, and the danger run by indiscriminate importation of plants is enormous.

(*To be continued.*)

RUDOLPH D. ANSTEAD.
Planting Expert.

Nitrolim.

In a recent issue of *Nature*, the following table of percentage of Nitrogen and approximate comparative prices was given :—

	Content of Nitrogen.	Price per ton.
Sulphate of Ammonia from gasworks	19·75%	£.13 0 0
Nitrate of Soda from Chili	15·5 %	9 15 0
Nitrate of Lime made by electricity	12·75%	8 10 0
Calcium Cyanamide made by electricity ...	18·00%	10 0 0

THE SCIENTIFIC DEPARTMENT, U.P.A.S.I.

Lime in Mysore Soils.—On page 487 of the present volume something was said about the Lime content of the soil in the Bababudin District. Mr. Oliver has called attention to a mistake, the soil in which the Lime content was estimated came from Hospet Estate and not Santaveri Estate. Hospet Estate is not on the Bababudins proper, but is situated on a flat some distance from the slopes of these hills, and its soil is dissimilar to the Bababudin soils. Apologies are tendered for making this mistake. The Lime content of the Bababudin soils is still open to doubt it would appear.

Phosphatic Fertilisers.—Referring to what was said in these columns about Bernard's Phosphate (p. 497) Messrs. T. Stanes & Co., write calling attention to their "Flour Phosphate." This fertiliser was described in the *Planters' Chronicle.* Vol. V, p. 81. It is prepared from the phosphatic nodules obtained in the neighbourhood of Trichinopoly. These nodules are ground very fine by special machinery so that the resulting product is at least 95 fine. The Phosphoric Acid in it is in an insoluble form and only slowly becomes available so that like Bernard's Phosphate it is a slow acting fertiliser. Messrs. Stanes & Co., say in their letter that an analysis they had made a few days ago of Flour Phosphate showed it to contain 25·42% of total Phosphoric Acid. The price is Rs. 45 per ton, so that the price works out at one anna and 3·2 pies per pound of Phosphoric Acid which, as they point out, compares very favourably with the lowest prices of Phosphatic fertilisers.

Fuel Trees for Tea Estates.—This subject was raised by the Delegate for Wynaad at the Annual Meeting of the U. P. A. S. I. and the notes on certain suitable trees given below were handed over to this Department with the request that they might be publised in the *Chronicle* in the hope that some expressions of opinion on the subject would be elicited from Tea planters who had any experience of growing fuel,

" *Wattle.*—One of the various Australian and Tasmanian Acacias valued to some extent for their wood and their bark which is rich in tanning: for *tanbark* the most important species are *Acacia decurrens,* or (if it is distinct from this as appears to be the case) *A. mollissima* the common black wattle, also called green or feathered wattle and *A. pycnantha,* the broad-leafed or goldenwattle. The silver wattle *A. dealbata,* closely allied to the black wattle, is distinguished by the ashen colour of its young foliage and is a taller tree of moister and ground. Its bark is inferior but is considerably used for lighter leathers.

" Other species yielding *tanbark* are *A. Saligna* (*A. leiophylla*) the blackwood or lightwood, *A. melanoxylon,* the native bickory (*A. subporosa*) *A. penninervi,* etc. Several wattles yield a gum resembling Gum Arabic somewhat exported for use in cotton printing as an adhesive etc. the principle sources of this produce are the black wattle, the broad- leafed wattle and *A. homolophylla.*

" As regards practical results, I found the *A. decurrens* and the *A. melanoxylon* the best, but great care should be exercised regards planting of same ;. if to be used for fuel I should suggest it being planted along a roadside, 20 yards either side—but entirely by itself as it spreads itself quickly by running roots—so as to facilitate transport, but if this cannot be done, then in swamps *not too wet* or steep hillsides, where landslips are likely to occur: but it should in all cases be planted apart from any other trees or bushes. Seed can be had very cheaply from the Manager of Yellapatty Estate, Ellapatti P.O., Travancore, S. India.

" Another good fuel tree and one which I found the best for the purpose in the High Range is the Eucalyptus or "Gum Tree." I found the Red Gum the best, but the Blue Gum or *C. globulus* has been extensively planted in low lying Districts and both it and the Red Gum are recommended for planting in malarious districts for the purpose of counteracting miasmatic influences. From the extreme hardness or the fibrous character of the bark, some are known as " Iron-bark," or " stringy bark trees " and others are distinguished as Mountain-ash : " Box " or Mahogany trees etc."

This subject has been under discussion before, and upon referring to the Forest Department they recommended *Cullenea excelsa* (Tamil, *Malai Konji* or *Vellepa*) and *Calophyllum inophyllum* (Tamil, *Ponnay*) as being suitable trees to cultivate for fuel. A description of these trees was published in the Sc. O. Note. 106 (Vol. VI., p. 206.) A planter also recommended *Melia dubia*, the Giant Neem, as a good fuel tree (Sc. O. Note III. Vol. VI. p. 298.) Various species of *Eucalyptus* are also worthy of trial and a list of the varieties available at the Lal Bagh Gardens, Bangalore, was given in the *Chronicle*, (Sc. O. Note. 130 Vol. VI., p. 565) while an article on the subject appeared as Sc. O. Paper No. 62 (Vol. VI., p. 235.) Recently seed of several species of *Casurina* were obtained from the Lal Bagh for a planter who is experimenting with fuel trees. This completes the references to the subject in the *Chronicle* and it is hoped that any planters who have experience of these or other trees as fuel will publish notes on them.

Nitrolim for Coffee.—At the Annual Meeting of the U.P.A.S.I. an interesting discussion took place about Nitrolim and its effects upon Coffee. Although no definite figures were produced there appeared to be a general agreement that this fertiliser does have a good effect upon the coffee, and it was evident that a great deal of interest was being taken in its use. The mixture recommended at the Annual Meeting in 1910 has produced some excellent results on some soils in Coorg. This does not mean that the mixture is suitable for all soils and climates but as it has given good results in some cases perhaps it is worth a more extended trial.

The mixture recommended was 5 parts of Basic Slag, 3 parts Sulphate of Potash, and 4 parts of Nitrolim. This will give a fertiliser containing about 7·5% available Phosphoric Acid, 11% of Potash, and 6% of Nitrogen. It should be applied at the rate of about six cwts. per acre in February or March. It is by no means certain that this is the best time to apply such a mixture, and work is now being undertaken to try and discover the best time to apply different fertilisers to Coffee. Till more knowledge on the subject is forthcoming it would appear best, however, to apply such a mixture as this in the dry weather before the monsoon and blossom showers. When Nitrolim is applied by itself it should be put out at the rate of two cwts. per acre, broad-casted and lightly worked into the top soil. Complaints are often made that it is difficult stuff to apply and that it burns the hands of the coolies. It should be first mixed with about nine times its bulk of dry soil. This renders it much more easy of application. The following references to this fertiliser and its application in the *Planters' Chronicle* may prove of use to those particularly interested on the subject :—Vol. V. pp. 366, 385. Vol. VI. pp. 90, 632, 704. Vol. VII. p. 188.

R. D. A.

DISTRICT PLANTERS' ASSOCIATIONS.

Wynaad Planters' Association.

Proceedings of a Meeting held at Meppadi Club, on Sept. 11th 1912.

PRESENT.—Messrs. Egan, Macleod, G. C. Parker, Powell, Stewart Vernede and C. E Abbott (Honorary Secretary).

Mr. Stewart in the Chair.

1789. *Proceedings of last Meeting* were confirmed.

1790. *Denudation of Tambracherry Ghaut.*—Read letter from Mr. Foulkes, District Forest Officer, North Malabar, with reference to para. 1779. The Meeting resolved to thank Mr. Foulkes for his very, interesting letter. Members are requested to send any information to the Honorary Secretary.

1791. *Sale of Westward Ho Bungalow.*—The Honorary Secretary informed the Meeting that the purchase money for this Rs.2,500 had been credited to the account of the Association.

1792. *Grant to Vayitri Club.*—Proposed that the sum of Rs.500 be paid from the funds of the Association to the Vayitri Club Committee for the purpose of building two bedrooms, and generally improving the Club.—Carried unanimously.

1793. *Stray Dogs in Bazaars.*—Mr. Stewart informed the Meeting that the Taluq Board had decided to enforce the proposed regulation (See para. 1787).

1794. *Schools on Estates.*—Mr. Stewart also informed the Meeting that grants may be obtained up to Rs.100 for putting up a building and a certain monthly amount depending on attendance through the Government Inspector of Schools, Calicut. For sums over Rs.100 application has to be made to the Educational Board, Madras. Mr. Stewart was thanked for the information he had obtained.

1795. *U. P. A. S. I. Meeting, 1912.*—Read a letter from Mr. Nicolls giving his report on the Proceedings:—

"I much regret being unable to attend the meeting of your Association to-morrow.

"I am afraid, except as a name, my representation as delegate from the Wynaad was a very poor one, and it is to be much regretted that Mr. Waddington was unable to be present. As the majority of those attending this year were making their first appearance as delegates at a U. P. A. S. I. Meeting, you will all no doubt miss those interesting speeches which have been made by delegates at past meetings—men who have got over the first stage of shyness and so learnt the way of speaking. A considerable amount of discussion on various subjects took place in Committee, most of which will never be printed. The Chairman treated us with a lenient hand, and I am certain he himself was pleased to see so much new blood present.

"It is unnecessary for me to remark on subjects at any length. Mr. Abbott will be much better able to explain any knotty points to you than I can.

"The Secretary's report was, as could only be expected, a very brief summary of the work done during the year.

"The Chairman's opening speech, I am certain, you will all agree, was tactful and to the point.

"The member of the Legislative Council The Hon'ble Mr. J. G. Hamilton was unfortunately unable to be present.

"*Finance.*—This is a matter Mr. Abbott will tell you all about.

"*Weights and Measures.*—An ever recurring part of the Agenda was ably dealt with by Mr. Hughes, a former member of your Association.

"*Roads and Railways.*—I did not vote for your Association as regards Mr. Hughes' resolution, but I feel certain that you all must hope that those millions Mr. Hughes and his seconder have set their eyes upon may be spent on Railway extension in India, and that South India may receive some share.

"*Cattle trespass.*—After considerable discussion in Committee I put a resolution before the meeting which was eventually carried. The opinion of those members objecting were, that no legislation was wanted, and that the present Act was sufficient, Delegates were given a brief summary of Mr. Stewart's case, but it was impossible to pass a resolution on same.

"*The Indian Tea Cess.*—A resolution was put by the Chair that the cess be renewed for another five years and was carried unanimously. Mr. Jackson spoke very much to the point. There is no doubt that the Fund has done good work and may be expected to continue doing so. We have been assured by prominent promoters of our industry that years of plenty lie before us. If so we shall not feel the small amount we contribute out of our prosperity.

"*Enticement of Labour.*—This is a matter which you have had much before you of late. There is little doubt that there is a growing opinion amongst some Associations that labour matters are not receiving sufficient attention. I may say without ample labour it is impossible to derive the full benefits from the Scientific Department. A scheme of registration was put before the Meeting and Mr. Abbott gave your views on the subject. A Sub-Committee was appointed to receive the opinions of the various Associations with a view to try and harmonize this into a workable scheme. I am afraid they have a hard task in front of them. All schemes can be improved on, but they must first be given a trial run. It may be impossible to present a scheme which would be unanimously adopted, but I feel certain that a start should be made. The Goodfellows were represented to us as wolves in sheep's clothing; they may have not intended to cover themselves in such unpleasant garb. There is little doubt that the circular issued by their agents in the Shevaroys must have upset the labour in that district. It would not be felt at the present moment when probably all coolies are under contract, but it is certain to make itself felt when coolies return to their country and find a '*Zemindari*' ready to further explain. The Goodfellows admitted themselves that 'From the Dorai in India to the Dorai in Ceylon' would in all probability be read by the cooly as we chose to read it. They admitted that thousands of their circulars had been issued and that any harm done could not be undone. Messrs. Carson & Co. were bound to do the best they could in their own defence, and they have done it well, ably backed up by the Ceylon papers. The Ceylon papers scorn the idea of 'crimping' by a Ceylon man. The island has improved since the day and only 'man is vile.' It may be so—we hope so.

"Ceylon recruiters have started agencies in the midst of districts where we have been recruiting our total requirements from for many years. A census of the population in those districts of available people as 'estate labourers' would, I think, prove to the Ceylon recruiters, that probably every cooly recruited by them from those districts was in all probability an advanced cooly of some estate in S. India.

"*Non-Service of Warrants.*—I had instructions from your Association to represent the difficulties two members of your Association had in bringing accused to trial even after warrants had been served. I was unable to give full details and Mr. Abbott kindly informed the delegates. I hope these cases will not be allowed to drop.

"*Trees suitable for fuel and timber.*—Mr. Anstead promised to deal with this matter in the *Planters' Chronicle.*

"*Election of Office Bearers.*—I voted for the members who were elected on your behalf. I think the choice was a good one. The election of Mr. Abbott as Chairman was a very popular one, and I am certain the honour done to him and your Association will be much appreciated by you all."

Mr. Nicolls was thanked for his services and his letter was ordered to be published.

The Honorary Secretary also read his report.

"In giving some account of anything of special interest to this Association that happened at the Bangalore Meeting, I wish to thank one of our Members, Mr. Nicolls, who was present as a Nilgiri Delegate for a great deal of assistance. I hoped he would have been here to-day. Mr. Waddington whom you selected to represent you, was unfortunately unable to attend. I did all I could, but being in the Chair, it was sometimes rather difficult for me to represent your views as fully as I could have wished. So I am personally much obliged to Mr. Nicolls. We passed a resolution to ask the Government of Madras to take steps to prevent cattle straying along the public roads, though some Delegates thought that it would have been better to have worked the matter through the S. I. Motor Union. We also voted in favour of renewing the Tea Cess for another 5 years. The opinion of the Tea Planting Associations throughout India is the same as ours, but I see that the Madras Correspondent of the Calcutta financial paper *Capital* thinks we ought to have gone against it.

"There was some discussion in Committee about the non-execution of warrants. and 3 resolutions proposed by the Nilgiri Association were carried by a majority. I voted against them on behalf of Wynaad, as if given effect to, they would hamper the issue of 'hand warrants' which we are allowed to have in Wynaad. The difficulty is that these warrants are not allowed to be used in the Nilgiris, and the planters there want them to be allowed under certain restrictions.

"A very interesting discussion arose over the methods of the Ceylon Recruiters, and the action taken by Governments outside India towards supplying their local planters with coolies at the expense of the public.

"The first subject has perhaps been sufficiently ventilated. But planters in India must keep a look out for attempts made on Estates to get their coolies to leave them and emigrate. The European Recruiters deny all knowledge of such practices, but are unable to keep a proper check on their native Assistants: while a section of the Colombo Press commends such attempts as real smart work. The Colombo papers are also lavishing a great deal of abuse on the advertisement composed by Mr. Martin and adopted by the U. P. A. S. I. designed to show the cooly that he can do better for himself by coming to work on plantations in India than by emigrating. The annoyance this advertisement has caused shows its value to us, and I hope that if the bad language continues, Mr. Martin will find time to rub in some of the statements.

" With reference to the second part of the discussion Mr. F. M. Hamilton informed us that the Zanzibar Government is importing coolies from Bombay to work its plantations. These coolies appear to get free passages and other inducements.

" Mr. Hughes drew attention to what the Straits Government are doing to help planters there. And the question of emigration to the F. M. Straits is the most important matter we have before us at present. There were 108,000 emigrants to Penang and other ports in 1911 from S. India, of these 80,000 were coolies for plantation work. Mr. Hughes informed us that the Straits Government pays all expenses for recruiting and travelling, and hands the coolies over to the planters free of debt. A correspondent to whom I am much indebted for all the trouble he has taken in the matter has sent me some further information on the subject which is not at present for publication. But I may say that Mr. Hughes was quite correct. The Straits planters do get their coolies handed over free of debt, with all expenses paid by Government, but they have to pay a poll-tax of 6 dollars a head yearly. They consider this too much, and would prefer to do the recruiting themselves, and be free of the poll-tax. One would think they must be hard up for something to grumble at, for there are few planters in India or Ceylon who do not pay more than Rs.10 per head for Maistry's commission, without mentioning the cost of recruiting and heavy losses in advances. Of course the conditions under which coolies can be employed in the Straits are onerous in the way of housing accommodation and medical attendance. But these conditions would exist in any case whether the coolies were recruited by Government or not. A Committee was appointed to suggest a scheme for improving the labour position, and the proposed scheme of registration is to be printed and circulated among District Associations with a view to coming to some definite conclusion before the next U. P. A. S. I. Meeting. I said that as far as Wynaad was concerned we were prepared to consider any registration scheme on its merits, provided, as a first step, Government agree to adopt it to prevent the emigration of advanced coolies and maistries, but otherwise not. I mentioned at a recent Meeting that Mr. Cammiade, our Divisional Officer, had suggested that we might induce coolies to take up land for paddy cultivation and so settle in the District: also that Government might perhaps grant the land on favourable terms, a plan which has been tried in Assam. I have seen it stated recently, that the system does not work well for the Assam planter, who finds that the cooly devotes all his time to his own work, and is never available for the estate. The plan has been tried here with Locals, with very much the same result: added to which they usually got hopelessly into debt.

" Several Associations have now agreed to subscribe to the U.P.A.S.I. on the 2 annas per acre basis, which we are already paying, on condition that the finances of the Central Association were put on a proper footing and fully enquired into. This has now been done."

The Meeting thanked Mr. Abbott for his report, and congratulated him on being elected Chairman. It was decided, as so much important matter was discussed in Committee this year, that copies of the Book of Proceedings be supplied to Members of this Association.

1796. *Taluq Board of Membership.*—Read letter from the President, Wynaad Taluq Board. It was decided to nominate Mr. H. B. Winterbotham for re-election.

1797. *Bad Grain in Bazaar.*—Read correspondence regarding Captain Willcock's report and letter from Mr. Cammiade. Mr. Gillatt and Mr. Darkin were thanked for the trouble they had taken in the matter.

1798. *Analysis of Fertilisers.*—Read letter from Mr. R. D. Anstead, Scientific Officer, forwarding a copy of the resolution passed at the U.P.A.S.I. Meeting, and asking to be informed what number of analyses Members of this Association are likely to require. Members are requested to inform the Honorary Secretary as soon as possible.

1799. *Post Office at Perrandotty.*—Mr. G. C. Parker called attention to the demand of the sum of Rs.264 by the Postmaster-General, Madras, for opening this Post Office; which sum is not to be returned, though the General Manager of the Panora Company has offered to provide free quarters for the Postmaster and his office, and to guarantee the Department against any loss for a year, in case of the Post Office not paying its way. Mr. Parker handed the correspondence to the Honorary Secretary. As the terms offered by the Panora Company have been considered sufficient in other cases of new Post Offices being established in planting districts it was resolved that the Postmaster-General be addressed on the subject.

1800. *Meppadi Club.*—Mr. Egan gave notice that at the next Meeting he would propose that a grant of Rs.1,000 be given to the Meppadi Club for the purpose of improving the building.

A vote of thanks to the Chair terminated the Proceedings.

(Signed) J. C. STEWART,
Chairman.

(„) C. E. ABBOTT,
Hony. Secretary.

INDIAN LABOUR IN MALAYA.

According to figures submitted at the recent annual meeting of the Planters' Association of Malaya the number of arrivals of Indian labourers for 1911 showed a material increase as compared with the previous years. The following returns show the net increase as represented by the difference between the number of arrivals and that of departures:

INDIAN LABOURERS ENTERING AND LEAVING MALAYA.

	Arrivals.	Departures.	Net Increase.
1909..............	49,817	31,374	18,443
1910..............	83,723	39,080	44,643
1911..............	108,471	48,103	60,368

These figures are considered very satisfactory, and it is expected that those for 1912 will be equally good. The number of imigrants in January, 1912, was about 12 per cent. more than in January 1911.—*The India Rubber World.*

FORESTS AND RAINFALL

Sir W. Schlich, F.R.S., Professor of Forestry at Oxford, writing in the new edition of the "Encyclopædia Britannica," defines a forest as "an area which is for the most part set aside for the production of timber and other forest produce, or which is expected to exercise certain climatic effects, or to protect the locality against injurious influences." One of the most important of the climatic effects ascribed by some to forests is the increased amount of precipitation, not only in the forest areas themselves, but also in the country surrounding them, produced by the influence of the forests upon the moisture laden air which passes over them.

Owing to the relatively small area of our forests and the rarity of serious floods or prolonged droughts, the question of the influence of forests upon rainfall has not received much attention in this country, but on the Continent,—in France, Germany, and Austria especially,—in America, and more recently, in India, the arguments for and against the existence of any influence have been put forward at great length, and sometimes with much energy.

The literature on the subject is somewhat bewildering, not only on account of its extent, but also because of the surprising divergence of views entertained by different authorities. Most European and some American writers are in favour of the accuracy of the supposed forest influence, while other American authorities maintain that the effect is entirely fictitious; that the instrumental records which have been adduced in support of it are affected by errors brought about by differences of exposure in the forest and in the open, and that, if there is a connection between forests and climate, it is the latter which controls the growth of the former, the former having no appreciable effect on the climate.

On one side the problem has been attacked by the historical method; that is, the state of a forest and the amount of rainfall in its vicinity are compared together over as long a period as possible. On account of the lack of trustworthy records of rainfall for the long periods required, the fall is usually estimated from accounts of the condition of some stream or river in the neighbourhood. As an example of this method may be cited the case of the river Loire, which in former times afforded communication by water between Nantes and the central provinces of France. In 1551 the Marquis of Northampton went from Orleans to Nantes, with his suite, in "five large, many-cabined boats," whereas navigation is now impossible above Saumur, the distance of which from Nantes is less than half that of Orleans. This change is ascribed to the deforestation carried on extensively in the surrounding country in the seventeenth century, and the consequent diminution in the volume of water in the Loire due to diminished rainfall. It is here tacitly assumed that the general climate over Western Europe has remained unaltered throughout the period, and that any change in the climatic conditions is due to local forest influence, secular changes of climate being entirely overlooked.

The strongest arguments in favour of the supposed influence are based upon observations at so-called "parallel" stations, *i.e.*, meteorological stations are established within a forest area and in the open country round the forest, respectively, and a long series of *simultaneous* observations are made at all the stations. In nearly all localities where such observations have been carried out, an appreciable difference exists between the rainfall measured inside the forest and that measured outside, the forest station having an excess of precipitation over the "parallel" station. A remarkable example is that of Lintzel, in Honover. In 1882 the rainfall at this station was considerably less than at most neighbouring stations. Young trees were planted round the station in 1877, and as they grew up the rainfall at Lintzel gradually increased in comparison with its neighbours, until in 1890 it was generally in excess where in 1882 it had been in defect. The objection urged against the historical method does not apply to this kind of reasoning, which appears conclusive on the face of it. In a series of recent papers in *Meteorologische Zeitsehrift*, J. Schubert has shown that a forest station in West Prussia and Posen has from 2 to 10 per cent., and in Silesia from 2 to 6 per cent., more rainfall than a parallel station in the open country. From this it is argued, that inasmuch as a forest increases the raintall over its own area, it may be expected to produce some effect of the same kind in the surrounding districts, because the wind would carry forward the rainbearing clouds formed by the forest influence.

The value of observations derived from parallel stations has, however, been strongly criticised by some American meteorologists. Prof. Cleveland Abbe has urged that the results are vitiated on account of the fact that a rain gauge exposed in a forest clearing is not subjected to winds as strong as those which pass over a gauge at a parallel station in the open country; and that. in consequence, the forest gauge may be expected to record more rain, although the real fall may be identical at the two places. As a result of his investigations, Abbe is of opinion that there is no appreciable difference in the rainfall outside and inside a forest. Schubert was aware of the force of this contention, and definite allowance was made for difference of exposure in the results quoted above. His margin is, however, so small, and the correction allowed on account of exposure differences is so uncertain, that his final result cannot be regarded as furnishing a conclusive solution of the problem.

In a report on the " Influence of Forests on Climate and on Floods," Prof. Willis L. Moore, Chief of the United States Weather Bureau, brings forward some considerations against the supposed effect of forests on rainfall. One piece of evidence shows how climate affects the extent of a forest area, and suggests that the influence, if any, is from climate to forest, and not conversely. Mr. E. Huntington, travelling in Chinese Turkestan, stated that " popular forests, which once extended for scores of miles. now form wastes of branchless dead trunks, like gaunt grey skeletons. and beds of dead reeds cover hundreds of square miles. It has often been asserted that the destruction of forests has been the cause of the diminution of rainfall. In the Lop basin the opposite appears to be the case; the supply of water has diminished, and therefore the forests have died."

The physical explanation for the increased rainfall which is put forward, is that the evidence is undisputed that air temperature is less and percentage humidity is greater over a forest than over the neighbourhood. In favourable circumstances, condensation of water vapour may therefore be set up over a forest, and once the condensation has started, it may continue automatically, owing to the large amount of latent heat liberated in the process of condensation, which will tend to set up convection currents.

Prof. J. von Hann's opinion on the subject, in the latest edition of his " Handbuch der Klimatologie" is that the question cannot be definitely answered at present, but that the effect, if any, should be greater in the tropics than in higher latitudes. Dr. G. T. Walker, of the Meteorological Office, Simla, is of a similar opinion. He states that if forests have any influence at all on the rainfall, it is probably not greater in India than 5 per cent.—*Nature.*

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(INCORPORATED.)

A Scheme of Registration.

ENTICEMENT OF LABOUR.

The following Resolution was passed on the 15th August, 1912 :—

"That a scheme of registration read at this Meeting be printed and circulated among District Planters' Associations in order that the subject may be considered thoroughly with a view to coming to some definite conclusion at the next U. P. A. Meeting."

SCHEME OF REGISTERING BY FINGER PRINTS.

Explanation of Terms used.—R. O.—Registration Officer for finger prints ; imprints—the finger and thumb prints of both hands : register—the person who sends imprints for registration. R. P.—the person whose imprints are registered. W. B. E.—Would-be-emigrant.

The Objects of the Scheme.—(1) To stop the emigration of any R. P.

(*N. B.*—Anyone ceases to be an R. P. directly his or her agreement is finished, or advance paid up on expiry of an agreement, *i.e.*, when the R. P's. ticket is returned to the R. O, and the R. O's. imprints taken off the files.)

(2.) To enable registerers to catch any R. P. who taken an advance from any other registerer.

Re-Working of Scheme.—Finger prints would have to be taken off the digits of both hands on forms supplied by the R. O. The outfit required for taking finger prints are (*a*) a small sheet of glass (*b*) some printers' ink, and (*c*) a cylinder covered with rubber for spreading the ink on the glass. When the form is filled in, it would have to be sent to the R. O., who would return a ticket with the number of the R. P. on it.

II.—Should imprints be sent for registration which are already on the files, the original registerer and the would-be-registerer would both be advised by the R. O.

III.—Re-registration would not be necessary unless the R. P. changed his address.

N.B.—An R. P. could make a fresh agreement on the same estate, as in the event of his trying to get advances on some other registering estate, the Superintendent, (*i.e.*, the registerer) would be advised of his being re-registered elsewhere.

WORKING OF THE SCHEME.

Re-Emigration —Government would have to be asked :—

(*a.*) To see that every W. B. E. got a pass from the R. O. stating that he or she was not an

(*N. B.*—To get this pass, imprints of the W. B. E.'s digits would first have to be sent to the R. O. If the imprints showed the W. B. E. was an R. P., both the Emigration Department and the registerer would be advised by the R. O.)

(*b.*) To see that the W. B. E. was the person whose imprints had been sent to the R. O. for the pass.

(*N. B.*—For otherwise imprints belonging to some one known not to be an R. P. might be sent to the R. O. and a pass obtained by which an R. P. could emigrate.)

Advantages to Government.—(1.) That by stopping the emigration of people who still owed money in the country, Government would prevent fraud and stop heavy losses in advances to the planting community, native landholders, bazaar men, etc. Losses in advances mean lower dividends and consequently less capital being brought in or spent in the country, and less trade. Losses to bazaar men, etc., mean higher prices to compensate.

(2.) That Police would not be constantly sent to serve warrants, etc., on false rumours that the accused was in a certain place.

(3.) That the Police should be advised by registerers as to the whereabouts of the accused.

(4.) That the identification of accused would be simple, as any suspected man could have imprints of his digits taken and reference made to the R. O.

(5.) That the wrong person would not be arrested.

(6.) That R. P.'s would quickly realise that they would be caught at once if they tried to get advances in any registering estate, and would be more easily found in non-registering estates, and so would work out their contracts, and save Planters, Magistrates, Police, maistries and contractors much time and trouble over cases, warrants, etc.

Notes on the Scheme.—(1.) If the majority of estates joined, fraudulent coolies would soon realise that non-registering estates would be a safe place to get advances from before bolting or emigrating, which would tend to make non-registering estates register to protect themselves.

(2.) It is probable that honest maistries would prefer the security given to them by registering estates.

(3.) It will be unnecessary to register local labour.

(4.) Except re-emigration we do not require Government's help.

(5.) Non-registering estates would be happy hunting grounds for the Police who want R. P.'s.

(6) If we can stop a certain amount of emigration we should I gather, have plenty of labour for all our needs and shall be able to stop increasing wages and advances.

Fees.—It is suggested.

I. That all registering estates should make a deposit with the R. O. to cover fees, as collecting fees, by V. P.'s especially small sums for advances, etc ; defaulting R. P's. would entail much more work, to the R. O. than periodically submitting accounts.

II. That one fee covers registering and cancelling.

III. That registerers pay a fee for advices re-defaulting R. P's.

IV. That a scale of fees could be fixed when it is ascertained how many coolies are likely to be registered, and consequently the cost of the office.

DISTRICT PLANTERS' ASSOCIATIONS.

Shevaroy Planters' Association.

Proceedings of the Annual General Meeting of the S. P. A. held at the Victoria Rooms, Yercaud, on Thursday 19th September, 1912.

PRESENT.—Messrs. J. C. Cobbe, F. Carey, S. Campbell, S. M. Hight, W. W. Hight, A. B. Kundaswamy, W. I. Lechler, J. C. Large, E. Large, C. Rahm, W. Rahm, L. Rochet, P. J. A. Williams, and Chas. Dickins (Honorary Secretary and Chairman). *Visitors*: Messrs. N. Hight and I. Lechler.

The notice calling the Meeting was taken as read.

(1.) *Honorary Secretary's Report, Delegate's Report and Passing of Accounts*:

ANNUAL REPORT.

GENTLEMEN,

In offering you a few brief remarks in connection with the working of this Association from 1st September, 1911 to end of August, 1912, I would first mention that there are 36 members on the roll up to date representing 4,825 acres—as against 30 members representing 4,200 acres at the close of last season. One member joined us from 1st July. This increase of members and acreage is due to the Pulney's having joined us at the commencement of the year.

At a General Meeting held in February last a resolution was unanimously carried that the subscription of membership be raised from Rs.20 to Rs.30 per annum, to include all subscriptions, except P. B. F.—thereby enabling this Association to meet its share of the enhanced subscription to the U. P. A. S. I.

We now pay the U. P. A. S. I. a subscription of 2 annas per acre, which includes the Scientific Department.

It gives me great pleasure to report that Mr. J. P. Bedford, I. C. S. Collector and District Magistrate, Salem, has become an Honorary Member of our Association. Mr. Bedford displays a kindly interest in matters connected with the planting industry on these Hills and also in the improvement of Yercaud, and during the short time he has been in the District he has done much for us. The Association is to be congratulated on having him on its roll.

I feel I must refer to the loss the Planting Community on the Shevaroys has sustained through the death of Mr. Carl Rahm—the oldest Planter on these Hills, and also one of the founders of our Association.

The deceased, from the formation of the Association till he retired from active work, took a keen interest in its welfare and for years continuously served on the Committee. He was of a kind and charitable disposition and was much respected and loved by all with whom he came in contact.

With reference to Accounts now under the hands of your Auditors, I beg to state that the income of the Association amounts to Rs.1,435-2-10 plus Rs.15 still due which I have no doubt will be paid in shortly.

The Income is arrived at as follows :—

	Rs.	a.	p.
Balance brought forward from last year's account ...	137	5	10
34 members @ 30 Rs. each	1,020	0	0
Subscription from one member for 6 months ...	15	0	0
Part subscription from one member for 1912 ...	15	0	0
15 subscribers @ 10 Rs. each to P. B. F. ...	150	0	0
By sale of bamboo and grass permit	23	0	0
and			
	74	13	0
refunded from the International Rubber Exhibition, very kindly presented by Mr. Cayley—to the Association—bringing the grand total to	1,435	2	10

The expenditure is as follows :—

	Rs.	a.	p.
Subscription to U.P.A.S.I on 4,825 acres @ 2 as. ...	603	2	0
Subscription to Experimental Plot on Nilgiris ...	40	0	0
Payment to U. P. A. S. I. for printing 1,500 Tamil circulars	12	0	0
To the P. B. F.	150	0	0
Delegate's expenses to Bangalore for year 1911, and year 1912	150	0	0
For printing 30 copies of Honorary Secretary's and Delegate's Report of 1911	5	0	0
To Forest Department for bamboo and grass permit..	25	0	0
Postage and Wires	10	0	6
Office establishments	204	0	0
Total Rs...	1,199	2	6

And leaving a balance in hand up to end August of Rs.236-0-4+Rs.15 still due and I have by me grass permits to the value of 2 Rs. Rs.236-0-4 I shall be glad to hand over to anybody you appoint as Honorary Secretary for the coming year.

I must take this opportunity to thank members for the prompt manner in which they have paid in their enhanced subscriptions this year, thus rendering the work of the Association a pleasure.

Owing to a less number of subjects coming up for discussion this year ; 3 General Meetings, 2 Committee Meetings, two Special General Meetings—were held—Two deputations were formed one to meet the Dy. Tahsildar and one to meet our worthy friends the Messrs. Goodfellow.

I desire to place on record the valuable services rendered in the past to this Association by Mr. C. G. Lechler. He made it a point to always attend our meetings—though latterly far from well, and displayed great energy, zeal and thought over subjects brought up for discussion. His departure from this country has left a blank in our Association, and I sincerely trust the time is not far distant when we shall have him in our midst again, with restored health and energy gained by his well earned holiday.

We have been modest in our demands this year and have only asked Government to open a cattle pound out on the Green Hills.

I have had official information from the Local Fund Engineer—that the link between the Head of the Salem Ghat Cart Road and the Varniah Cart Road is to be constructed, estimated to cost Rs.4,000 and the work will commence as soon as a capable local contractor comes forward. It is most gratifying to report that Local prices of coffee of all grades last season, were the highest on record for many years, and I hope this happy state of affairs will continue. I trust members will see their way of giving attention to the circulation of coffee price Post Cards this season, as doubtless those who sell locally find the information advantageous

In conclusion the Committee and myself place their resignation in your hands and in tendering my resignation I would draw your attention to the fact that I have had the honour of representing your Association for nearly 4 years. The undertaking of the Secretaryship has been made pleasant by your co-operation, help and advice for which I heartily thank you. I consider this a fitting opportunity for you to elect a fresh Honorary Secretary from amongst your members, so before the close of the meeting I shall feel thankful if you will kindly elect office bearers and Honorary Secretary for the coming year.

DELEGATE'S REPORT.

Your delegate attended the Annual Meeting at Bangalore on 12th August and carried out your instructions to the best of his ability on those subjects which directly concern this Association. As full details of the meeting were published in the M. M. and *Planters' Chronicle*, it is unnecessary for me to take up your time by going over the different subjects, so a short summary is herewith subjoined for the information of members.

In connection with roads and communications this Association on behalf of the Pulneys put forward the following resolution with reference to the Ahtoor Ghat Road, which was carried.

AHTOOR GHAT ROAD.

" That the District Board of Madura be asked to hand over the Ahtoor Ghat Road to the estates on the Pulneys, that are interested in its repairs and upkeep, and to allot Rs.1,000 (minimum) per annum towards its maintenance, provided that the estates concerned guarantee to spend at least Rs.700, per annum over and above that sum for the next 5 years."

" Also that the Board be asked, should the estates' contributions exceed Rs.700, that the District Board allotment may be increased proportionately. And further that the District Board be informed, should the above proposals meet with the District Board's approval, that the contributing estates are prepared to supervise the work on the road and to submit such accounts as may be deemed necessary by the Board."—Carried.

Before I left for Bangalore I received a communication from Government with reference to a resolution we put before the U. P. A. S. I Meeting of 1911, on the subject of " bees and fertilization." In this letter Government inform us that the Government Botanist and Mr. Fletcher, the future Madras Entomologist state that it has not been proved that Bees are essential for the pollination of coffee, and so forth. Rather than let the subject wait for another year, I placed the following resolution before the U. P. A. S. I. which was carried,

" That the U. P. A. S. I. be asked to bear the subject of bees and fertilization in mind and that the Secretary be empowerd to remind the Government of Madras to allow their Entomologist to investigate the matter some time before the coffee blossoms next year and offer them all the Assistance in their power."

The question of labour was discussed and occupied the attention of the meeting for a considerable length of time. You have all read Mr. Barber's Scheme of Registration which was published, and a resolution was carried to the effect that it be printed and circulated among District Associations in order that the subject may be considered thoroughly, with a view to coming to some definite conclusion at the next U. P. A. S. I. Meeting. Also that a Sub-Committee be formed to receive the opinions of the various Associations before the next Annual General Meeting with the idea of improving the labour position—a resolution also to the effect that the names of all known recruiters for places outside India be printed in the *Planters' Chronicle* —was carried.

This has already been done in *P. C.* of 31st August, but I think as far as Salem is concerned the name is incorrect. Goodfellow said the recruiting Department at Salem was managed by a European. I don't think Sivalingum, supplier, is one, at least he was not when I knew him 3 years ago.

The publishing of Mr. Goodfellow's leaflet that had been circulated on these Hills some few months ago, caused considerable surprise, and the U. P. A. S. I. highly approved of our action in drawing general notice to this very important matter—however regrettable. The Ceylon Press appear to have taken a different view of the case judging by the vindictive articles that have appeared from time to time in the M. M. against us, and I consider our thanks are due to our worthy Chairman, Mr. Abbott, who has so ably defended us against those uncalled for attacks.

With reference to the adulteration of coffee I think it will interest all members to know that the following resolution was carried. "That Government be approached through the U. P. A. S. I. with a view of dealers in this country being restrained from selling coffee in tins, with a large percentage of cheap admixtures, under the name of "Pure Coffee" without adding the percentage of adulterant." Concerning the Scientific Department, a most useful resolution was passed with reference to the Guarantee Analysis of fertilisers sold to Planters by different firms be periodically verified by the S. O. and that if he had too much to do, Coorg and Mysore might spare their Assistants for a month in the year.

This subject is on to-day's Agenda paper and a reply to be sent to the S. O., as to whether this Association intends to take advantage of the Resolution.

And with reference to indigenous manures a resolution was carried to the effect that a small Committee be appointed to go into the matter of the export of indigenous manures before the next meeting. And firms supplying the commonly used fertilisers be asked to explain the difference in cost per lb. of Nitrogen, Phosphoric acid and potash as supplied by them.

As regards non-Service of Warrants it was suggested that the U. P. A. S. I.—write to the District Inspector-General of Police, Southern Circle, with the hope that he would issue orders to all Superintendents to the following effect:—

> "That any Magistrate issuing the warrant to a Maistry should notify the D. S. P. of the district concerned that such a warrant has been issued.
>
> "That all hand warrants should also be endorsed by the D. S. P. of the district in which the warrant is to be served or by his office Manager.
>
> "That, on the enquiry of a Planter as to the status of any particular Maistry, the Superintendent of Police for the district in which the Maistry lives shall make enquiries as to the Maistry's standing and means and report the same to the Planter."

Two exhibits from this Association were sent to the U. P. A. S. I. Exhibition. Rubber from Mr. L. E. T. Short and Fibre from Mr. J. C. Large.

Mr Short's Ceará Rubber samples, coagulated with water without any acid showed what an advance had been made with this at one time despised and neglected source of rubber.

(*b*) The Accounts after being audited by Messrs. C. Rahm, and F. Carey were passed, showing a balance in hand up to end August 1912, of Rs.236-0-4.

Proposed by Mr. W. I. Lechler and seconded by Mr. J. C. Large and carried unanimously: "That a hearty vote of thanks be accorded to the Honorary Secretary for his past year's services and for kindly representing this Association at the late U. P. A. S. I. Meeting, also that his reports be adopted, printed and circulated to all members."

(2.) *Fertiliser Analyses.*— Read circular No. 639 dated 29th August from Planting Expert. Resolved: That this Association accepts with thanks the resolution passed at the last U.P A.S.I. Meeting with reference to Fertiliser Analyses, and that the Honorary Secretary be instructed to inform the Planting Expert that four different fertilisers are likely to be sent in for checking about the months of April and May.—*Carried unanimously.*

(3.) *An appeal for assistance from P. B. Fund.*—The steps taken by the Honorary Secretary in the above case met with the approval of the Meeting.

(4.) Read letter dated 15/9/12 from Mr. S. C. Cobbe to Honorary Secretary *re.* absence of Registrar's Clerk from office on office day. Resolved: "That the Honorary Secretary be requested to write to the District Registrar to enquire whether in the absence of the Registration Clerk, the Sub-Registrar himself is not bound to execute registration work on an office day."

(5.) *Roads.*—Read letter dated 12/9/12 from Mr. J. C. Cobbe, *re.* culverts for Kiliyur cart road and letters dated 15/9/12 from Messrs. E. Large, S. M. Hight, and W. Hight *re.* decrease in width in places on the Yercaud to Vellalakadi cart road by the D. P. W. owing to system of scraping away the earth on both sides of the road surface, and small cross drains. Proposed by Mr. S. M. Hight and seconded by Mr. E. Large. "That—in view of the alarming manner in which the contractor is reducing the width of the feeder road in places, during the course of upkeep, by cutting the earth from both sides of the road surface to the centre, thus reducing the original width and level of the road in each process, causing boulders to crop up which were originally below the road surface, and which are a source of danger to traffic and also the number of Irish bridges and cross drains—the Honorary Secretary be requested to draw the attention of the Executive Engineer, Salem, to the above facts—with the request that the feeder roads be kept up to their original width of 12 feet throughout, all boulders removeed, Irish bridges filled in, and culverts substituted on both this and the Kiliyur roads, also that the three zigs situated near High-fields Velalakadi and Mangalam be improved to enable cart-traffic to get round without difficulty."—*Carried unanimously.*

(6.) Read letter No. 693 dated 21/8/12 from D. B. Engineer to Honorary Secretary stating that Rs.4,000 had been sanctioned for the purpose of forming a road from the head of the Salem Ghat Cart Road to the Varniah Cart Road. Recorded with satisfaction.

(7.) Read and recorded letter No. 657 dated 5th September, 1912, from Planting Expert with reference to " Bees and Coffee Fertilisation."

(8.) *Election of Office Bearers.*—The following gentlemen were elected office bearers for the coming year.

Chas. Dickins (Chairman and Honorary Secretary).

Committee.—Messrs. C. G. Lechler, J. C. Large, C. Rahm, S. M. Hight, W. Rahm. F. D. Short and Revd. Rochêt.

A vote of thanks to the Chair terminated the Meeting.

(Signed) CHAS. DICKINS,
Hony. Secy. & Chairman.

Bababudin Planters' Association.

The First Annual General Meeting of the Association was held at Santaveri, on Wednesday, September 18th, 1912.

PRESENT.—Messrs. Denne (President), Dennis, Boyd, Johnson, Kerr, Oliver and Kirwan (Honorary Secretary).

PRESIDENT'S ADDRESS.

Gentlemen,—This is the First Annual General Meeting of the Bababudin Planters' Association and I am glad to be able to congratulate you on bumper crops and good prices for last season and I hope that prices will keep up for some seasons, as after the long period of low prices we deserve good prices for some time to come.

Scientific Assistant.—During the year a good deal of progress has been made in connection with the Planting Industry in Mysore and, most important of all, a Scientific Assistant has been appointed and some of us have had the pleasure of welcoming him to our estates, and, I hope, during his time among us he will be able to do great things for coffee planters with the advice of the Scientific Officer.

Council.—A Council of the Mysore Planters' Associations has been formed which is a step forward and shows that Mysore Planters are trying to pull together and combine, and combined, we are much stronger than separate. Through the Council it should be possible to do much, among other things fix rates of coolies' wages, commission, &c., and I hope that no increase in rates will be started by anyone until the Council and all the Planters' Associations have agreed to it.

Experimental Plot.—An Experimental Plot under the U.P.A.S.I. has been started on the Nilgiris to hybridise coffee and obtain for us a new plant and I hope it will be successful and produce one that will crop well, be free from leaf and other diseases and produce a sample that will sell in London at a good price. I myself believe that what we want is a hardier plant and put more faith in that than in anything else yet proposed to assist the coffee industry in India.

Coolies' Pay.—Prices now are good, but if they fell as they are certain to do in a few years, how can we afford higher pay and if the pay of coolies is once raised it will be very difficult to lower wages again.

Labour.—Labour is, I think, the most gloomy subject of all. Labour is being drawn away from Mysore by Ceylon and other places who can afford to pay higher wages than coffee planters. Agencies were started last year on the M. & S. M. Railway by Ceylon to recruit coolies almost at our doors. I am glad to say when it was represented to the Ceylon Agency, the recruiting Depôts were removed, but they still have a recruiter in Mysore. Some of us have lost Mangalore coolies who have been attracted by higher pay to Rubber Estates. The coolies are also becoming more prosperous and leaving the estates in large numbers every year to start cultivation in the 'Maidan country' a great deal of new land has been taken up in the last year or two for cultivation in 'maidan.' A proposal was put before the U. P. A. Meeting to start a scheme of voluntary Registration of labour—this is a move in the right direction as something must be done in this our most important question, and if this or some other scheme is found to be practical, I hope this Association will support it.

Pests.—I understand that the Green or Pulney bug is in Bangalore at some of the gardens and that plants of various sorts are continually being sent up to the District, and we run very great risk in importing the Pulney bug with these plants to our estates. Native planters also import plants from the Lal Bagh and other gardens in Bangalore. I would suggest that fruit and other plants in future should be procured from places where there is no green bug such as Saharanpoor, Poona and other places. I think Native planters also ought to be warned of the destruction that green bug has caused on the Nilgiris and Shevaroys, where estates have been entirely ruined by it. I do not know if it is possible to get the Mysore Government to introduce a Pest Act and enforce it in Bangalore from where plants are distributed all over the Province. Some orange plants were actually sent up to a planter last year with Pulney bug on them. Luckily he detected it and destroyed the trees.

Finance.—I have said nothing about this as the Honorary Secretary in his report will tell you about it.

I now have to thank you for the honour you have done me in electing me President, and I am sorry I have not been able to spare more time to attend to Association work, and I have to thank the Honorary Secretary for the assistance he has rendered me.

I now place my resignation in your hands and do not seek re-election.

Honorary Secretary's Report and Accounts. The accounts as audited by Mr. Watson were laid on the table and explained by the Honorary Secretary and passed by the Meeting.

Delegates to U. P. A. Meeting.—Mr. Oliver read a short report of what took place at the U. P. A. Meeting with reference to matters in which this Association is interested.

A vote of thanks to the Delegates was passed.

C. of P. A's.—The Association agreed to the voting being on the basis proposed by the N. M. P. A.

A letter from the Scientific Officer with reference to the proposed tour of Mr. Bainbrigge-Fletcher, to investigate the question of the necessity of Bees in Fertilising Coffee was read. Mr. Oliver offered to make arrangements to show Mr. Fletcher round should he come to this district.

Black List for Maistries.—A letter from the Secretary of the S.M.P.A. was read. It was resolved that the Association would be very glad to join in the scheme, and hoped the S. M. P. A. would formulate a scheme.

Election of Office Bearers resulted as follows :—

President, Mr. A. B. Boyd ; Vice-President, Mr. A. C. W. Denne.

Honorary Secretary, Mr. N. G. B. Kirwan.

A Vote of thanks to the outgoing President and Honorary Secretary was proposed by Mr. Oliver and seconded by Mr. Dennis.

(Signed) NOEL G. B. KIRWAN,
Honorary Secretary.

RUBBER.

Ceara Rubber.

The Annual Report of the Department of Agriculture of the Uganda Protectorate, according to the *India Rubber Journal*, shows that Ceará found some favour during the year with a certain section of the planters, and several estates are confining their attention very largely to this tree. A number of the planters have always been sceptical as to the merits of this tree, and latterly some of the Ceará enthusiasts seem to be joining the doubters. The advantages of Ceará are that it may be expected to give a quicker return, and a further advantage, which no doubt accounts largely for its extended cultivation, is the extreme ease with which it can be propagated.

The question of the advisability of planting Manihot glaziovii is one that many planters would like answered. A method of tapping that gives some promise is the system of vertical pricking with the multiple pricking tapper. The area of the Protectorate over which the Ceará tree grows freely is so much greater than that suited to other kinds of rubber, that the question is one of some importance.

There can be no doubt that the rubber is there, and the problem is to find a method of tapping that is suited to the tree,

In forwarding the following notes upon the methods of tapping Ceará Rubber and the results obtained, Mr. A. G. Nicholson, Coonoor, states that the results were obtained " under very adverse conditions of weather." He adds that, " the U blade we make to fit the Pask Stock is double edged, so that when one side is worn it may be turned over and the other used. They cost Rs. 6 per dozen." He also calls attention to the effect that " the angle of marking for Ceará should be 22½ degrees. A piece of tin 17 inches square is cut as for marking Pará and the Ceará marking tins are made from it as shown in Diagram 2."

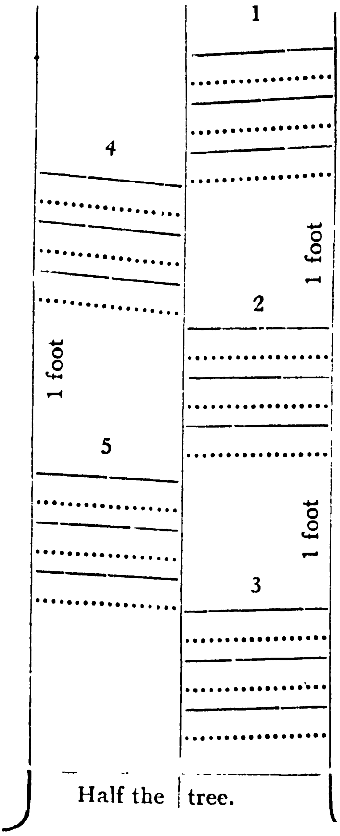
The Ceará trees from which these results have been obtained are planted amongst young Coffee 8 x 8 in alternate lines and thus average 12 x 12 itself.

Method of Tapping.

Tapping is done with a special U blade fitted to a Pask Stock introduced by me 3 years ago, which if properly set renders injury impossible unless the cooly goes *twice* over the *same* cut the *same* day.

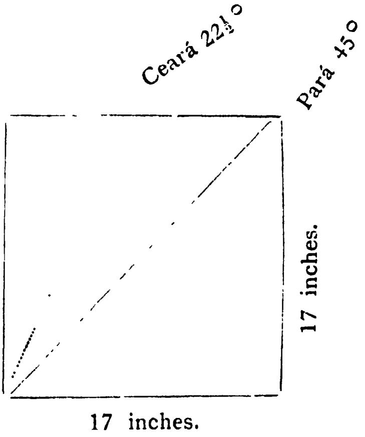
1. All trees to be tapped alternate days or daily according to the weather, one cut only in each foot each day.
2. Knives to be set so that they *cannot* cut more than ⅛" wide and 1/16" deep. If too deep, the deep tapping cuts off the supply of latex for the 2nd round *above* the deep cut, and the yield decreases.
3. Knives must be as sharp as razors.
4. In the diagram (1) each cut is supposed to be ⅛" wide, and each cut to represent one day in each foot.
5. The cuts are ⅛" apart for 1st round, and 2nd round the cuts come in between 1st and 2nd cuts of the 1st round, for the 1st day, between 2nd and 3rd for 2nd day, and so on, still only one cut per day in each foot.
6. Put the cuts in ⅛" apart and use ⅛" guide bamboo strips for ruling the lines ⅛" apart, *before* cutting, as this keeps the lines equidistant, they look better, tapping in the future is easier, and the maximum number of cuts are got in.

DIAGRAM 1.



1st round,	1st cut,	1st day.
2nd round,	1st cut,	1st day.
1st round,	2nd cut,	2nd day.
2nd round,	2nd cut,	2nd day.
1st round,	3rd cut,	3rd day.
2nd round,	3rd cut,	3rd day.

DIAGRAM 2.



[Each foot one cut per day. This diagram shows five tapping lined numbered 1 to 5, one for each round, 15 cuts the first round of 3 days, 15 cuts the second round of 3 days. Total, six days, 30 cuts as per diagram.

Each foot will give 48 days both sides of the tree, 96 days for each round.]

Results.

3rd Year tapping. Trees planted in 1906.

Tapping alternate days 1st 3 weeks, after that daily. The cost includes women carrying water a long distance.

		Trees.	Coolies.	lbs. wet.	Cost *Rs.*	*a.*	*p.*
8th June	...	2,497	30	20·0	9	0	0
15th „	...	3,340	35	32·3	12	13	0
2nd „	...	3,600	36	49·8	14	9	0
29th „	...	4,500	36	59·8	14	9	0
Rainfall—January to June 30th, 8·61							
Daily tapping this month.							
6th July	...	5,720	46	50·0	16	9	0
5th „	...	4,800	48	54·0	16	6	0
20th „	...	6,000	48	65·0	17	8	0
27th „	...	6,000	48	61·2	17	0	0
Rainfall—January to July 31st, 8·91.							
3rd August	...	5,260	42	60·0	17	2	0
10th „	...	6,000	48	68·11	18	10	0
17th „	...	5,250	42	58·14	17	4	0
24th „	...	5,250	42	56·4	17	6	0
31st „	...	5,250	42	57·7	16	6	0
Rainfall—January to August 31st, 13 inch 4 cents.							

100 lbs. wet sheets dried separately gave 47½ lbs. dry, but a second test is being made as stocks show better results.

In a Report on the Government plantations at Kampala it is stated that:—

"The Ceará planted during the year has been planted at various distances apart, with the object of determining the most suitable distance; 1½ acres have been planted 12 feet by 12 feet, 1½ acres 14 feet by 14 feet, 5 acres 16 feet by 16 feet. All of these being planted on the square system and 5 acres 16 feet by 16 feet one the hexagonal system, which gives a more equal distribution of the trees and a greater number per acre than the square method. The growth of the trees, all round, has been very good, and the breakages by wind have been very few, and in those cases where the tops have been broken off a new top has speedily been formed. Tapping was commenced on 20 trees on the 15th November and continued to the end of December. The yield was small, but the trees were young, and the season not very favourable. These trees were again tapped in March, and gave better results, and 20 smaller trees were also tapped, these giving similar results to those obtained with the trees tapped in November and December. The method of tapping in each case was the "half-herring-bone" to half the circumference of the trees, paring and pricking immediately afterwards. The height tapped to, in the first instance, was 4 feet, but in the two latter instances 5 feet, the lateral cuts being 1 foot apart at an angle of 45 degrees. No chemicals were used in the first instance, but in the two latter instances a dilute solution of ammonia was placed in the collecting cups to prevent coagulation."

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THE U. P. A. S. I.

(INCORPORATED.)

U. P. A. S. I. Section.

In last week's *Chronicle* was published The Registration Scheme passed at the last Annual Meeting in August. The Chairman wishes that all the Members should have their attention specially drawn to it, and hopes that every Member will study it, and that any suggestions that they may have to make, may be sent to the Secretary, who will forward them to the Sub-Committee formed to draw up a workable scheme before the next Annual Meeting.

A letter from Messrs. Parry & Co , is published, calling attention to a clerical error that was made in the advertisement about Finely Crushed Bone Meal.

An extract from Mr. Webb's letter to the *Times of India* is published which emphasizes the letter by the same gentleman lately printed in the *Chronicle.*

The Scientific Officer continues his article on the Prevention of the Introduction of Insect Pests and Fungoid Diseases of Plants, also contributes a valuable paper on Superphosphates and Rubber Tapping. The Relation of Ants to Plants also finds a place, and the Intensive Farming in India by John Kenny is the subject of a short review.

Mr. Sandow's advertisements, praising cocoa at the expense of tea, has roused much antagonism as will be seen by the extracts published. Under the heading " Rubber" is reprinted a long and interesting article on its development, cultivation, trade and industry.

The attention of all readers who may have urgent reasons to communicate with the Secretary by telegraph are advissd that " Planting" has been registered as the surest means of reaching him.

All telegrams meant for the Scientific Officer should be addressed, Anstead, Bangalore.

Correspondence.

Dear Sir,—We regret that by a clerical error we have given in our advertisement our guarantee for " Steamed Bone Meal instead of " RAW " and shall be obliged if you will kindly alter this in your next issue. Our guarantee for Raw Bone Meal, for which we quote Rs.69 per ton Rails Ranipet is 4 *to* 4½% *Nitrogen, 22 to 23% Phosphoric Acid.*

To explain matters we should much appreciate it if you would kindly publish this letter in your columns.

Yours faithfully,

Madras, 2nd October, 1912. (Signed) PARRY & Co.,

Managing Agents.

Scientific Officer's Papers.

CIX.—PREVENTION OF THE INTRODUCTION OF INSECT PESTS AND FUNGOID DISEASES OF PLANTS.

(Continued.)

To prevent a plant disease which has been introduced into the country from being spread from one district to another is a difficult matter especially in a country like India. Legislation on the subject would have to follow the lines of the legislation introduced to prevent the original introduction of pests from other countries which was outlined in the first part of this paper, and it would be most difficult to enforce. Possibly education and co-operative action among big bodies of planters would do more good than actual legislation.

That there is a necessity for some sort of action is, however recognised, and it is noticeable that at a recent Annual Meeting of the Bababudin Planters' Association as well as at the Annual Meeting of the U. P. A. S. I. the subject was brought into prominence.

At the former meeting the President in his address said!—

" I understand that the Green or Pulney bug is in Bangalore at some of the gardens and that plants of various sorts are continually being sent up to the District, and we run very great risk in importing the Pulney bug with these plants to our estates. Native planters also import plants from the Lal Bagh and other gardens in Bangalore. I would suggest that fruit and other plants in future should be procured from places where there is no green bug, such as Saharanpoor, Poona, and other places. I think Native planters also ought to be warned of the destruction that green bug has caused on the Nilgiris and Shevaroys, where estates have been entirely ruined by it. I do not know if it is possible to get the Mysore Government to introduce a Pest Act and enforce it in Bangalore from where plants are distributed all over the Province. Some orange plants were actually sent up to a planter last year with Pulney bug on them. Luckily he detected it and destroyed the trees."

The matter is under discussion at present between the Scientific Department of the U, P. A. S. I. and the Mysore Economic Botanist, and it is possible that a system of fumigation may be voluntarily adopted at centres of distribution like the Lal Bagh Gardens, and other horticulturists gradually taught and encouraged to adopt similar preventive measures by means of demonstrations, and through the medium of the Horticultural Society recently formed in Bangalore. This matter is under discussion and no more can be said about it for the present, but the Scientific Department of the U. P. A. S. I. have recognised that it is a very serious matter.

There is possibly a certain amount of danger in importing Tea Seed from districts which suffer from Blister Blight. At the Annual Meeting of the U. P. A. S. I., held in 1911, Mr. McRae, the Government Mycologist, speaking on the subject said:—

" Half the difficulty was to know how it got into the District. He was perfectly convinced that he knew how it got in. He was certain it was introduced from the outside, but there was not enough proof to bring it home that it came either from North-East Assam or from the jungles round Darjeeling. For about a fortnight he hunted all the jungles, but he did not get a particle of anything like blister, and he could not get anyone to confess that he saw blister blight shortly after using imported seed. He saw some badly blighted tea in a block in which some new plantations had been opened and he was quite convinced that it was introduced from North-East Assam in the tea seed, or packages of earth in which the seed came. He could not prove it, however, and there was no one brave enough to say that he introduced it. He would certainly advise all planters getting seed from Northern India to disinfect it, by destroying the packages of earth in which the seed comes and to disinfect the seed by steeping it in formal in or corrosive sublimate for an hour. These two would he found quite sufficient. It was quite easy to kill the spores of blister blight; even a very weak solution of salt was sufficient. It did not matter what disinfectant they used, as long as it was done thoroughly. He would certainly advise no planter to get tea seed from northern parts round Dibrugarh and Darjeeling—he knew that the best tea seed did come from Dibrugarh—if he was unwilling to run the slight risk of introducing the disease." *Book of Proceedings, 1911.*

It would seem comparatively easy to arrange for such disinfection as recommended without the aid of legislation, and possibly the difficulty of confining known diseases to certain districts could be very largely got over by co-operative methods among planters, but it is very important that planters should realise the dangers which they run when they import seed or plants from outside districts.

(*To be continued.*)

RUDOLPH D. ANSTEAD.
Planting Expert.

ANTS IN RELATION TO PLANTS.

It is commonly supposed that ants are injurious to cultivated plants, due to the general occurrence of ants on diseased and sick trees. There are probably, however, no kinds of ants directly injurious to plants expect the leaf cutting species found in South America. The ants which are so often found infesting the plants and even making their nests at the roots of trees are present for a particular purpose, and are usually associated with the presence on the tree of Aphis or Scale Insects. Some species of ants take care of aphis (green fly) and make nse of them in a manner comparable to man's treatment of such domestic animals at the low.

Many of the Scale Insects so common in India excrete a sweet liquid on which the ants feed and plants infested with scale insects frequently swarm with ants going from one scale to another in search of food. In some cases the ants erect mud shelters over these scales as is seen in Coorg where they proteet the Mealy Bug which attacks the coffee roots in this way bringing the scales into shelters made on the branches of the shade trees. Sheltered in this way the scales live in safety from their enemies and adverse climatic conditions repaying the ants for their care with supplies of honey dew.

Ants also make galleries up the stems of some plants under cover of which they ascend, and in these galleries scale insects are often found. Again ants infest the roots of plants attacked by scales. In all these cases the ants probably protect the scales from which they derive food from attacks of their enemies, and they in all probability also carry the eggs and young scale insects to suitable places on the plant and thus work in their distribution.

This natural arrangement between the scales and the ants is indirectly harmful to the plants and any scheme for the eradication of scales must probably take into account these swarms of insects also.

THE SCIENTIFIC DEPARTMENT, U.P.A.S.I.

Superphosphates.—It is not always understood that in Southern India soils are as a rule very deficient in Carbonate of Lime, and that the system of manuring adopted with large quantities of organic material together with the organic mulch from the shade trees in the case of coffee, tends to make the soils acid. The consequence is that acid manures like superphosphate are not suitable, and though Basic Superphosphate may be an apparently wasteful form of phosphatic manure it suits our conditions. Ordinary Superphosphate is an acid manure which upon soils containing little or no Lime is not so desirable as fertilisers of a neutral or alkaline nature. Basic Superphosphate is produced by the addition of Lime to ordinary Superphosphate which renders it alkaline, and although not so soluble a compound as ordinary superphosphate it is easily dissolved by the organic acids in the soil water and it becomes readily available to plants. When superphosphate is applied to the soil the soluble phosphoric acid it contains is rapidly precipitated. To some extent the clay in the soil provides the necessary base for this process, but in most soils the Calcium Carbonate takes the chief part in the reaction with the production of dicalcium phosphate. The best effects are therefore obtained from ordinary superphosphate only when applied to soils which are at least moderately well supplied with Lime, and in the absence of this constituent the value of the manure will be considerably diminished, Hall in his book on ' Fertilisers and Manures ' says:—"The essential condition that should dictate the choice of superphosphate as a fertiliser is the presence of sufficient carbonate of lime in the soil to ensure the precipitation of the soluble phosphoric acid as a calcium compound. On acid soils, on some clays, and on many sands and gravels, there is such a deficiency of carbonate of Lime that the phosphoric acid becomes precipitated as Iron or Aluminium phosphates which possess a much lower solubility in the soil water and are therefore less available to the plant." Our soils are deficient in calcium carbonate and many are either acid or on the verge of acidity and for this reason ordinary superphosphate is not a suitable manure and a Basic phosphatic manure *must* be used. Probably the best method is to apply Lime first and then the Superphosphate and thus secure the advantage of their more uniform distribution in the soil which their solubility in water when separate ensures, but the cost of Lime sufficient for this method of treatment is prohibitive in this country.

Rubber Tapping.—In the article on Ceará Rubber published in last week's *Chronicle*, the distance apart of the trees in question was 16 x 16 and not 12 x 12 as stated. An obvious misprint also occurs at the foot of the diagram. The first two lines should read, " Each foot one cut per day. This diagram shows five tapping lines numbered 1 to 5, one cut for each round, &c." Mr. A. G. Nicholson, Coonoor states that he is tapping and curing Hevea Rubber on Hawthorne Estate at 3 annas 4 pies per pound of dry rubber, and Ceará Rubber at 5 annas 5 pies per pound of dry rubber which he points out, " speaks well for hill rubber especially for Pará with scattered trees in thick Coffee." It would be interesting to know how these results compare with those obtained by other planters, and it is hoped that information of this nature will be sent in to this Department for publication.

Rainfall.—Bangalore has lately been experiencing very heavy rains. During September 21.66 inches fell in the Station and this constitutes a record, the highest fall of recent years in September having been 18.58 inches in 1897.

R. D. A.

INTENSIVE FARMING IN INDIA.

BY JOHN KENNY. HIGGINBOTHAM & Co., 1912.

This book is a compilation of a number of pamphlets which have been published by the author from time to time into one volume. It is written primarily for the raiyat and does not contain very much that is of special interest to the planter, though there are chapters on the manuring of Tea and Coffee.

The author pins his faith on the use of artificial manures to be obtained through co-operative agricultural Associations. Those who have the agricultural welfare of the raiyat at heart do not all agree that his salvation lies in the use of expensive artificial fertilisers that require skill to use, however.

In a thoughtful paper by Messrs. Meggitt and Birt published as an appendix to the Proceedings of the Board of Agriculture in India for 1911 (Superintendent of Government Printing, Calcutta, 10 annas) the view was put forward that soluble artificial manures of a forcing character, highly expensive, and capable of being abused in unskilled hands, are not suited to the improvement of Agriculture in India as far as the raiyat is concerned. The authors are turning their attention to more permanent methods of soil improvement, those more calculated in their opinion to keep up a healthy vigorous soil constitution and soil climate and more suited to the necessities, natural resources, and economic conditions of India and its people. They strongly advocate a system of manurial practice under which the organic matter and Nitrogen required for the crop are obtained from the atmosphere by the aid of leguminous green dressing crops, and the only manures to be directly added are in the case of acid soils a very occasional dressing of lime and rather more frequent dressings of bone-meal, and in the case of alkaline soils only bone-meal at intervals. The addition of nitrogenous organic matter should be augmented by dressings of cow manure, the only manure generally used by cultivators at present. Such a system with a suitable rotation of crops they consider capable of yielding large profits and keeping up the permanent fertllity of the land.

The chapters on Tea and Coffee manuring are frankly disappointing. The former chiefly consists of numerous quotations to back up the author's opinion that the burial of prunings is a bad practice, an opinion wlth which a large number of planters in Southern India will not agree in the light of their experience of this practice.

Instead of burying the prunings, " the safer plan in the writer's opnion, would be to remove them and after stripping off the leaves at some central spot to stack the branches for future use as fuel and to allow the leaves to decompose in a heap, sprinkled with some soil and a little freshly burned lime." The cost of removal has been lost sight of and it would be prohibitive in these days of shortage ot labour. If prunings are not burieu the only practical alternative is to burn them and scatter the ashes and replace the Nitrogen by means of organic fertilisers.

In the case of Coffee the author recommends the more extensive use of Potash as a fertiliser, and in this he is in all probability right.

The book contains a great many irritating misprints, but it is worth reading and much that the writer has to say is well worth the attention of his audience, and it is to be hoped that his book will find a place where he wishes it to, "in the homes of the peasants translated into the various vernaculars of the conntry."

TEA.

A Deleterious Advertisement.

A certain objectionable method of advertising Cacao in opposition to Tea by implying that Tea drinking causes one of the most dreadful diseases from which modern humanity suffers, together with the comments it has called forth in Ceylon and London will probably prove of interest to Tea Planters in Southern India.

" '*Does Tea cause Cancer*,' is the heading of "Sandow's Cocoa" advertisement which is inserted daily in the London and leading provincial papers and which unproved, injurious questions is thus being sunk into the minds of the vast number of readers and yet no one here moves a finger to make those strong representations which should put a check to traders' activity in thus framing an advertisement to damn a British industry. It comes particularly badly from Mr. Sandow, a German, who has made England his home and has apparently made plenty of money by pushing his various ventures in England. He bases his heading upon a book by the Hon. Rollo Russell, the author of "Preventable Cancer," who points to seven countries, coffee consumers, which had the maximum cancer rate, and to England with the highest quantity of tea per head which now has the maximum cancer rate. It would be interesting to know where Australia, with its high rate of tea consumption per head, stands as regards the cancer rate. An active movement to re-assure the public mind after this bout of adverse advertising is very advisable. Query—in what quarter are we to look for initiating this movement?"

"Since writing this I hear late to-day that the views above given are also those of several influential colonists, and the matter has been taken up as far as writing to the Secretary, Ceylon Association in London, to draw his attention to this matter, suggesting that action should be taken without delay."

Thus A. L. H. in "Current Coin" in the *Weekly Times of Ceylon* of September 14th. The *Grocer* for August 31st also deals with a similar advertisement, or possibly the same one, as follows :—

"Little surprise will be occasioned among members of the trade by the indignant protests which are being made against the unwarranted attack upon the tea and coffee trade which is contained in the advertisement that is quoted in our Correspondence pages to-day. It raises the question, "Does Tea cause cancer?" and by implication, if not directly, answers it in the affirmative. The advertisement is one of the most indiscreet we have read for a long time past. It is calculated to do considerable harm to the tea and coffee trades by fostering the idea that these wholesome, valuable, and popular, beverages are "a prolific cause of cancerous disease;" and it cannot fail to have undesirable results upon the trade of the advertisers themselves, for retail grocers have a very practical way of showing their resentment towards advertisements or advertising methods which they deem to be objectionable, and they will not suffer any unwarranted attack upon such an important section of their business as tea and coffee, particularly the former, represent. It is folly to attempt to foster the sale of an article such as cocoa by giving currency to theories which are calculated to inflict severe damage upon the tea and coffee business, and which a credulous section of the public may accept as actually proved and demonstrable facts. There is nothing whatever in the work on

"Preventable Cancer" to prove that any case of Cancer has ever arisen or could arise from the consumption of tea or coffee, and the advertisement referred to, if continued, is certain to cause wholly unnecessary alarm and to prejudice tea and coffee without in any way promoting the popularity of cocoa, more especially as on the same page of the book as the "drug" paragraph appears, is a strong indictment of all hot foods, the author even maintaining that hot mashes are the cause of cancer in cattle; and as mashes are generally made of linseed, the "potent drug" cannot here be held responsible. We most emphatically condemn advertisements in the public press such as that under notice, and if the advertisers consult their best interests they will withdraw it at once."

THE CENSUS OF CEYLON, 1911. ESTATE STATISTICS.

We have to thank Mr. E. B. Denham, the Superintendent of Census Operations. Ceylon, for another of his valuable Reports, this time dealing with estates only, and giving by name each estate enumerated by its Estate Superintendent or by some persons appointed by him, and the principal estates enumerated through the village headmen, together with the names of the Revenue and Planting District of each estate, and separate figures as to males and females, races, religions, and literacy of the population on each estate.

An estate map of Ceylon showing the planting districts and a map showing the district in the Madras Presidency, from which labour is principally recruited, have also been included in this volume, while figures in a separate table give valuable information as to the districts in India from which the estate labour is drawn; they show the number of immigrants from each district in South India. This is the first Census, Mr. Denham says, at which it has been found possible to obtain these figures. At this Census all persons born in India were required to state the district in India, or the Zillah or Taluk—or at least the nearest post town—of the village in which they were born. The register kept under Ordinance No. 9 of 1909 was of considerable use in supplying this information on the estates. The co-operation of all responsible for the enumeration of the estates is gratefully acknowledged. In a very large number of cases, however, the village names were only inserted in the schedules, and these had all to be traced through the Madras Post Office Guide, Gazetteers, etc. The names had frequently to be repeated aloud and pronounced by different persons in order to arrive at any idea as to what name was meant, many of the enumerators having no knowledge of Indian names and in some cases of any Indian language. The labour involved in tracing the place names was considerable, but the results are successful. Out of 470,651 entries of birthplaces in India, is only 8 cases the Province of birthplace could not be traced, and in only 22 instances had the heading "Madras Presidency" only to be given. Figures for the estate population of the island are also given by sex, race, religion, age, civil condition and birthplace. It is hoped that the figures given for each estate are accurate, but it must be realised that in several instances where estates are sub-divided, *e. g.*, in the case of groups, and where portions were enumerated by different enumerators, there was likely to be some confusion as to the figures for each separate division; while the total for the group which was all that was actually required for Census purposes was correct, the figures for separate estates in the group may not always have been correctly apportioned. Mr, Denham winds up his remarks with the announcement that copies of the volume under notice will be forwarded free—on application to him—to estates where the colies were enumerated at the Census by the Superintendent or by some person appointed by him. We congratulate Mr. Denham on the most interesting and successful manner in which the present volume is brought out.

The following is the summary of the estate population in the island in 1911 :—

Province.	No. of Estates.	Persons.	Males.	Females.
Western ...	173	44,145	25,334	18,811
Central ...	958	379,317	148,767	133,550
Northern ...	6	202	115	87
Southern ...	47	9,486	5,694	3,792
Eastern ...	4	381	309	81
North-Western ...	156	15,006	9,412	5,594
Uva ...	192	71,957	38,180	33,777
Sambaragamuwa ...	297	92,973	50,757	42,217
Total ...	1,833	513,467	278,558	234,909

Out of the above totals, 17,495 males and 7,911 females are Low-country Sinhalese ; 7,564 males and 5,529 females are Kandyan Sinhalese ; 10,103 males and 9,362 females are Ceylon Tamils ; 234,594 males and 205,708 females are Indian Tamils ; 1,683 males and 823 females are Ceylon Moors ; 2,078 males and 1,627 females are Indian Moors ; 1,635 males and 730 females are Burghers and Eurasians ; 661 males and 576 females are Malays ; and 2,397 males and 1,911 females are others.—*The Ceylon Observer.*

ADVERTISING INDIAN TEA IN AMERICA.

A very long and interesting letter has been received at the Office from the Indian Tea Cess Committee regarding the good work being done by Mr. R. Blechynden, the Cess Commissioner in the United States, in advertising and pushing Indian Tea in the States. Unfortunately, the report from Mr. David Pym, formerly a Member of the Executive Committee of the Cess to the Secretary, Indian Tea Cess Committee, is too long to publish *in extense* in the *Chronicle.* Mr. Pym reports very highly of the work being done by Mr. Blechynden. At present Mr. Blechynden is concentrating all his efforts in St. Louis, where little or no tea has been drunk, very good pioneer work has been done. To reach and capture such large cities as Chicago more funds are required on the Canadian Coast. Indian Tea has got a firm and increasing hold there. The world's Fair will be held at San Francisco in 1915, and it is to be hoped that Indian Tea will make a brave show. Mr. Pym suggests spending £20,000 in advertising in lieu of the £10,000 now being spent. It is needless to press the advantages of advertising. 'As ye sow, so shall ye reap.' The American public have to be educated in geography as their present idea is that Darjeeling is in Ceylon. Pure Indian tea is apparently little drunk, a blend of Ceylon and Indian Tea being mostly in demand. Nor is pure Ceylon tea sold, and mostly consists of a blend of Indian, Ceylon and China tea with possibly a proportion of Formosa.

RUBBER.

Development of the Cultivation, Trade, and Industry of Rubber in the World.

The Bulletin of the Bureau of Agricultural Intelligence and of Plant Diseases for May 1912 published by the International Institute of Agriculture, at Rome, gives the following account of the Rubber Industry of the World.

"The amount of Rubber produced in the whole world is about 70,000 tons, worth about £28,000,000. Notwithstanding the use of inferior qualities and the manufacture of substitutes, the consumption of rubber has continued to increase. The struggle between wild rubber and plantation rubber is becoming always more severe, because the prosperity of many tropical countries, whose chief resource is rubber, is at stake upon the issue.

"The States interested in the question of the species of rubber susceptible of cultivation must make a rigorously scientific enquiry in order to determine the best conditions of growth, to select the seed, bearing plants and the seed, to decide upon the methods of tapping and of coagulation, and of industrial exploitation. For *Hevca* the majority of these problems are solved. TheRubber States should encourage ph ysical and chemical research on the nature and composition of the latex, as well as on the theory and practice of vulcanising.

"The whole problem of the scientific utilization of rubber plants presents still a nnmber of unanswered queries. The contest between wild and cultivated rubber may drag on for some time to come, so the countries producing wild rubber should hasten to introduce the cultivation of plants adapted to their soil and climate so as to enable them to parry the blow that sooner or later is sure to fall on them.

" At present the most esteemed rubber plant of Asia is *Hevea brasiliensis* or Pará ; it is indigenous to Northern Brazil and is acclimatised in Ceylon, in the Malay States and in the Straits. In the South of Brasil *Manihot* is prevalent, and in Central America as well as in the southern parts of N. America *Castilloas* are the chief rubber plants. After these, may be mentioned *Sapium* (Andes), *Guayule* in Texas and Mexico, and some *Loranthaceae* of Nicaragua and of Brazil with their rubber-bearing fruit.

" The most important rubber plant of Asia is *Ficus elastica*, the most useful of the *Ficus* which are found also in America, Africa and Oceania. The commonest lianas of Africa and Madagascar are *Landolphia* and *Clitandra*, and in West Africa the rubber tree *Funtumia elastica* (*Kickxia elastica*) the best of the several *Funtumias* is met with. But no doubt many rubber plants still remain to be discovered. Every country requires special rubber plants and it is not advisable, either from a commercial or an economic point of view to try to obtain everywhere the same product from the same plant, which would entail the risks attendant upon monoculture.

" Hitherto, however, it is beyond doubt that the best results obtained by plantation rubber have been yielded by *Hevea brasiliensis* both for quality and quantity.

" In those countries where the soil and the climate most resemble those of the home of *Hevea*, the cultivation of this rubber plant offers the greatest probabilities of success, provided the supply of labour be plentiful. The area under *Hevea* in the Malacca peninsula is about 358,000 acres, and in Ceylon, Cochin, China and the Dutch colonies about 383,000 acres.

"The amount of labour required is enormous; still, Asia with its coolies has nothing to fear from the competition of South and Central American plantations, in which labour is much more expensive.

"Of the 75,000 tons of rubber produced last year including "Guayule," 39,000 were Brazil Pará. In 1911 the total production of cultivated rubber was 12,750 tons and this amount will go on increasing, because the *Hevea* plantations are still young. Assuming the area of Asiatic cultivations at only 592,800 acres, containing 160 trees per acre and yielding an average of 900 grams. of rubber per tree, Asia alone will produce in the year 1916, 86,000 tons of rubber, that is more than the present out-put of the whole world. One of the first effects of this will be that Brazil will not be able to exploit profitably its wild rubber. The produce of Brazil and of the less accessible regions of Africa will gradually disappear from the world's markets. Every country must guard against the dangers of monoculture. Plantation rubber will also dispel the illusions entertained about synthetic rubber, which will be much dearer than the cultivated product.

"The relative importance of the various regious will be seen by the following review of their yields.

"Brazil leads, with 40,000 tons of rubber exported in 1910. But its production being stationary. does not make a further increase seem probable. There are still, especially in Acre, some reserves of *Hevea* and *Castilloa*, but their yield is limited by the exploitation and labour conditions. The forest production of West Africa was 15.000 tons in 1909. Belgian Congo exported in 1910, 3,105 tons of its own produce and about 1,000 tons in transit. German East Africa exports chiefly liana rubber. In four years the United States have imported from Mexico about 225,000 tons of *Guayule* bushes.

"During the last 10 years at least £48,000,000 of European capital has been invested in rubber plantations in British Malasia Ceylon, Southern India, Java, Sumatra and Brneo. The menace of Eastern rubber has obliged the Brazilian Government to take measures to diminish the cost of Pará, to promote the plantation of *Hevea*, and reduce by 50% the impure duties on food stuffs. At the same time the Government hastens the construction of the Madeira-Mamore railway for the benefit of the rich rubber regions of the Acre district and of Upper Bolivia.

"On the future of rubber, owing to its vast importance, several forecasts have been made; thus it is predicted that while the financial efforts made in the East by England, Holland, Belgium, France and Germany for the new plantation will limit Brazilian and African competition, they will be the ruin of upwards of six hundred companies that have been formed for the production of rubber.

"The Rubber Growers Association of London calculates the extent of rubber plantations in the whole world at 790,000 acres, from which the yield in 1916 will be 108,000 tons. But in all these calculations a certain margin must always be left for a very important factor, namely labour, which can never be exactly valued for the future.

"The yearly percentage of the increase in the consumption of rubber is valued at 5 to 15 and even 20 per cent.

" The United States alone possess about 400,000 motor cars, and in Germany their numbers increase, yearly by 50 to 60 per cent. Canada and Japan are now launching into the rubber industry.

" Electrical apparatus of all kinds require rubber in ever increasing qualities for its insulating properties, and rubber paving will soon come into general use, besides which hundreds of new applications of rubber are constantly being invented. All this holds out promise of success to the rubber plantations.

" With the new applications of rubber and the constantly increasing demand of manufactured rubber, the trade in the raw material is daily becoming more important in the markets of the world. Besides, if rubber is required in certain industries, the rubber works themselves are dependent on other industries and further their development.

" Each of the great centres of the rubber trade deals almost exclusively with the rubber of some particular place of origin. Thus Liverpool trades in South American rubbers, London in Asiatic and, considering the future of rubber in the East, it is easy to foretell that the importance of the Liverpool market will soon be inferior to that of London; Antwerpisthe mart for Congo and Amazonian rubbers, Rotterdam, Congo and Dutch East Indies, Amsterdam imports chiefly from the colonies of the Indian Ocean. Hamburg receives all the rubber required by German manufactures. Bordeaux has specialised in African varieties, while Havre purchases Pará. New York buys everywhere.

" In 1909, 1910, and 1911 the following quantities were imported by the chief centres. The total sum is larger than the amount stated as the total world-production, because sometimes the same parcels of rubber pass from one market to another.

			1909.	1910.	1911.
Liverpool	...	tons.	22,436	27,601	23,474
London	...	„	5,435	9,127	12,875
Antwerp	...	„	4,685	4,058	4,336
Hamburg	...	„	7,500	7.700	—
Havre	...	„	3,781	4,458	4,008
New York	...	„	31,129	32,946	—

" The various markets have different methods of sale.—Liverpool and London sell by public auction, Antwerp, Rotterdam and Amsterdam by tender, Hamburg as futures, New York and Bordeaux personally, for immediate delivery. For the examinstion and valuation of rubber in the various markets, a scientific method of classification will become always more necessary.

" It is necessary also to provide each of the markets with a station for the mechanical tests for rubber; something in this direction has already been done in Germany. At Antwerp rubber is well controlled by the " Caisse International d'Anvers."

" The fundamental principle of the manufacture of rubber is based on the chemical changes following on the absorption, at a given temperature, of a certain quantity of sulphur or other similar chemical substance, which process is called vulcanising. The theory of vulcanizing has not yet been satisfactorily explained. Every kind of rubber must first be washed, purified and dried. Between the gross weight of the rubber as it enters a factory and the weight of the washed, purified and dried sheet there is a difference due to waste which is sometimes considerable. The following table gives the average wastage for various rubbers:—

Pará Fine Amavens	16 to 18%
„ „ Island	18 to 20%
Sernamby Manaos	25 to 30
„ Peru	30 to 35
Mozambique	15 to 20
Massai	8 to 10
Niggers	20 to 25
Kasai	8 to 10
Borneo	40 to 45
Thimbles (grass rubber)	45 to 55
Crepes	1 to 2½

"The rubber, containing the due proportion of sulphur, must be brought to a certain temperature in order to undergo the required chemical and physical modifications. After being vulcanised it is prepared in sheets, the thickness of which varies with the articles to be manufactured.

"In order to utilize old rubber, means have been sought for the regeneration of the rubber by depriving it of the free sulphur and other bodies it contains, but hitherto no one has succeeded in removing vulcanisation sulphur without completely destroying the rubber. In Germany however one factory exploits an improved process for the regeneration of the valuable matter which still exists latent in rubber waste, by employing appropriate means for transforming vulcanised rubber which has lost its original property of adhesiveness.

"The so-called artificial rubbers (factices) are substances that have nothing in common with real rubber. They are mostly drying oils like the wood-oil of China, vegetable albumen, casein, and gelatin.

"The future of synthetic rubber seems very problematic, all the more so considering what has been said above on the subject of plantation rubber."

EXTRACT FROM MR. WEBB'S SPEECH.

The Hon'ble Mr. M. De P Webb, in a long letter to the *Times of India* replies in detail to the Simla telegram defending the Government's Management of the Indian Currency and Indian Treasury Balances. Mr. Webb says:—" We find that the following sums: £8,400,00 of the Paper Currency Reserve, £18,000,000 of the Gold Standard Reserve and £14,000.000 of the Indian Treasury Balances, in all over £40,000,000 have actually beyond all doubt been removed from India and are at the present moment lying in England. partly (over £16,000,000) invested in depreciating sterling securities, partly (over £14,000.000) lent out at from 2 to 2½ per cent. to London Joint Stock Banks and other money dealers, and partly (nearly £6,000,000) lying ear-marked in the Bank of England bearing no interest at all. I have frequently urged. and still maintain, that the removal of all this money has been not only wholly unnecessary, so far as the interests of the people of India are concerned, but it has been carried out to the unquestionable loss and disadvantage of India. Moreover, the transfer of much of this money has been made in direct defiance of the recommendations made to the Government by the Indian Currency Committee specially appointed by the Secretary of State in 1908 to advise him in these currency matters."—*Daily Post, 2nd October.*

The Planters' Chronicle.

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(INCORPORATED.)

Census of Cochin State.

The Report on the Census of the State of Cochin by C. Achyuta Mendil B. A. has just come to hand and forms a most interesting record of a prosperous and progressive Native State. The following is a short digest of some of the many interesting statistics dealt with in the Report.

The total area of the State is 1361½ square miles and the total population 918,110, with a mean density of 675 per square mile, which is equalled or exceeded by few States or Districts in India, Cochin-Kanayannur and Cranganur being the most densely populated taluks in Southern India with a density of 1802 and 1747 respectively. The enormous density of the sea board is attributed by the author of the report "mainly to the adaptability of its soil to the generous growth of the cocoanut palm. The cultivation of the tree, and the manufacture of the articles out of its produce, such as copra, oil, coir, toddy, arrack, etc., afford ample occupation to the large numbers of people living in this tract."

56'24 per cent of the total area of the State is cultivated, and 4'08 per cent. is under irrigation, and 42 per cent. of the whole cultivated area is under Rice. The average Annual Rainfall of the State is 103'44 inches.

Since the last Census in 1901, the population has increased by 13'6 per cent. and the decade under review shows a marked industrial development. The State Railway and Forest Steam Tramway have been constructed during this period. "Two timber saw mills, three or four cocoanut oil mills, a weaving mill and a number of brick and tile factories were opened during this period, and the forests were opened up for Rubber plantation on a large scale. The result of these circumstances has been a steady growth of population at what may be considered a normal rate."

The Coffee planting industry is almost confined to the Chittur taluk and most of the coolies leave the estates at the end of February and the beginning of March. Consequently as this Census was taken on the 11th March, this district showed a small number of people. In 1901 the Census was taken earlier and the population of the Neliampatis showed 3,018 while at this Census owing to the reason stated the population was only 794.

It is noticeable that the inhabitants of Cochin are on the whole stay-at-home people. 95% of the population were born in the State. The number of Cochin born people enumerated in the Indian Census outside the state was 25,047, nearly twice as many as in 1901. "This increase was chiefly due to emigration of coolies from Cochin to Ceylon which has been going on to a considerable extent in recent years. As many as 4,056 Cochin born people are found in Ceylon. They are mostly coolies and the majority of them are from the Mundakapuram and Talapilli taluks." The author concludes that, "it seems to be clear that the outward movement in search of employment elsewhere is on the increase however slow it may be."

With regard to the religion of the people in Cochin the most noticeable feature is the preponderance of Christians over Mohamadans, which is without parallel anywhere else in India except in Travancore. There are nearly four Christians to every Mohamadan, and both sects are growing rapidly as compared with Hindus, which fact no doubt accounts largely for the increasing industrial development of the State.

Malayalam is the vernacular and official language of the State and it is spoken by over 89 per cent. of the population.

In point of literacy, that is the ability to read and write, Cochin again stands ahead of all the Districts of Southern India except Madras. In every 1,000 of the population 151 are literate, while in Mysore State, for instance, only 63 are literate. English education has also made marked progress during the last two decades, 230 people in every 10,000 now being able to read and write English.

Agriculture is the predominant occupation of the people of Cochin as it is of the people in most parts of India, exactly half the population being supported by this industry; 21 per cent. are engaged in industrial pursuits and 13·6 per cent. in commerce.

There are six Rubber Estates in the State and these employ 3,194 persons. Rubber is a growing industry in Cochin and new plantations have been opened out since the Census was taken. Coffee on the other hand is a declining industry, the number of persons employed in it having dwindled to about 1,000 as compared with 2.000, ten years ago. The Rubber Estates are all owned by Europeans and it is of interest to note that there are only 47 European British subjects in the State, and 29 other Europeans.

It is noticeable that the number of owners and managers of hotels, cook-shops, &c., have increased nearly six fold owing to the establishment of coffee shops in all parts of the State during recent years, while the number of vendors of wine and liquors have declined owing to the greater restrictions placed on the sale of liquor.

R. D. A.

THE COFFEE TRADE.

According to reports from Brazil, frost has occurred in the coffee districts of Sao Paulo, causing damage to the flowering plants. which may have a serious effect on the growing crop. Estimates as to the extent of the damage are conflicting. and it is too early yet accurately to gauge the effect on the probable out-turn of the crop. When the unfavourable reports were first received the terminal market sharply advanced, but subsequently reached somewhat on lower quotations from New York and the Continent. Naturally the reports of damage are received with a good deal of scepticism.—*The Grocer.*

DISTRICT PLANTERS' ASSOCIATIONS.

South Mysore Planters' Association.

Minutes of Meeting held at Chickanhully Travellers' Bungalow, September 26th, 1912.

PRESENT.—Messrs. F. M. Hamilton (President), W. L. Crawford, D. Jackson, P. Hunt, W. F. Scholfield, C. K. Pittock, C. J. Hayward, L. Lake, K. Thammayer, G. N. Frattini (Scientific Assistant) and M. J. Woodbridge (Honorary Secretary).

Report of Delegates to U. P. A.—Mr. F. M. Hamilton read a report touching on all matters of interest to this Association which came up before the U. P. A. after which a general discussion took place and the delegates explained various points and answered questions.

In the course of the discussion it was decided to take advantage of the resolutions passed at the U. P. A. Meeting with reference to the checking of guaranteed coffee fertilisers. It was pointed out that the greatest care was necessary in taking samples and labelling them and the following resolution was put from the chair and passed: "That this Association is of the opinion that individuals should draw samples of any fertilisers that they buy under guarantee and may wish analyzed and should forward the samples direct to the Scientific Officer, Bangalore, and not to the Honorary Secretary.

Instructions to Delegates to the Mysore Representative Assembly.—After the selection of Mr. W. L. Crawford as Delegate had been duly confirmed by the Meeting, instructions were given him on various subjects of Local interest.

Council of Mysore Planters' Associations.—Some questions as to rules and constitution were answered.

Seat on the Hassan District Board.—A letter from the Deputy Commissioner of Hassan was laid on the table in which he stated that he could find no records in his office that the South Mysore Planters' Association had ever been asked to submit a name for nomination to a seat on the Board, but that as his own nominee had resigned, he had no objection to the South Mysore Planters' Association now submitting a name for nomination. As, however, no explanation as to why the last Association representative had been superseded without notice, the Association decided not to nominate a member at present.

A most interesting and instructive paper on lime and its connection with the fertility of the soil was read by the Scientific Assistant followed by a general discussion.

(Signed) M. J. WOODBRIDGE,
Honorary Secretary.

The Deplomatic and Consular Report on Spain says of Rubber: One half of the total imports under this class consist of raw rubber and manufactured goods containing rubber. The raw material and rubber goods of all classes have been imported during the last three years to the following values:—

	Pesetas.
1909	8,955,000
1910	10,113,000
1911	13,076,000

THE SCIENTIFIC DEPARTMENT, U.P.A.S.I.

THE APPLICATION OF LIME TO MYSORE SOILS.

At a Meeting of the South Mysore Planters' Association held recently, Mr. G. N. Frattini, the Scientific Assistant for Mysore, delivered the following lecture.

"During my first tour of the Bababudins and North Mysore in last May and June, I was particularly struck with the very vague ideas which were often extant with regard to Lime and its relation to plant life and the soil. Until this most important constituent of the soil together with its fundamental principles is thoroughly understood, it cannot be expected that Lime will occupy the position it should in the world of Agriculture.

"I do not think it would be out of place here, to say a word or two on the origin of Lime.

"Calcium (using the technical name) is found in nature in combination with several other elements, in the form of the carbonate, sulphate, phosphate and more complex double silicates. The one which I intend to say a few words about is the Carbonate of Lime as this is the one which concerns us most in Agriculture.

"Calcium Carbonate, otherwise known as Calcite or Iceland spar, is found in the shape of colourless and well defined crystals and also in beds of what we call Limestones. The former one might say is only a transition into the latter. The crystals are acted upon by water charged with carbonic acid in which calcium carbonate is soluble. When the water loses its carbonic acid, which it does in the course of time by evaporation, the calcium carbonate in solution is redeposited in minute crystals and these in their turn become cemented together into solid beds of what are commonly called Limestones.

"Chalk Cliffs, or Beds, are a more recent formation and have an organic origin by the deposit from waters of minute living organisms, Corals, diatomaceae, etc.

"The great majority of the fossils in most sedimentary rocks contain a large proportion of Calcium Carbonates.

"Calcium Carbonate is present in most soils. According to the origin, the amount of Lime varies proportionately rising to as high as 60%, but generally in cultivated land it is not much more than 1·2% and in some cases it is almost entirely absent, the usual type of Coffee Soil to be found in Mysore contains only about one or two tenths per cent.

"Lime was known to be used in Agriculture in the very early times. It was used by the Romans; and in the earliest records of British Agriculture it was part of the routine of farming.

"In England when Liming was more general very large amounts used to be applied, sometimes as much as 6 to 8 tons per acre.

"Let us first of all consider what physical action lime has on the soil.

"Lime is usually applied to the soil as Carbonate, Hydrate, or Oxide, but no matter in which form it is applied, it eventually all becomes converted into carbonate. There is one essential factor, however, and that is, to get the best advantage from the use of lime it is most important that it should be brought into a very fine state of division before application, and the best way this can be effected is by using hydrated (or slaked) lime; a good admixture is then obtained with the soil.

"The great improvement which lime effects can hardly be exaggerated especially when applied to heavy Loams. It renders them more friable, and flocculates the fine particles of clay, causing them to aggregate into larger lumps, and percolation and aeration are increased. There is also less shrinkage and tendency to cake on drying. So much for the physical side.

" Now we come to the chemical side which is far more important.

" On soils which have a tendency to become sour liming is of the utmost value. It rectifies any acidity present and by so doing it increases the vitality and numbers of the nitrifying bacteria which convert ammonia into nitrates. When organic matter decays it gives rise to various organic acids commonly called 'humic acids.' It has been proved that where this acidity is allowed to accumulate it puts a stop to the life of the Bacteria which induce nitrification and gives rise to the growth of Moulds and Fungi which utilise the plant food for their own benefit and set up a denitrification. I might mention as an example the slime fungus which causes 'Finger & Toe' among the Turnip crops in England and which can be entirely checked by a thorough dressing of lime.

" All land to which nitrogenous manure has been applied year after year, is apt to have a large accumulation of residues, from previous manuring lying dormant on account of wanting a base such as lime wherewith the organic acids can combine. Thus by giving the soil a periodical dressing of lime this manure is recovered and oxidation is once more set in action; nitrates are formed and rendered assimilable to the plant.

" Both Phosphoric Acid and Potash are also rendered more available by the application of lime. For example soil may contain a considerable quantity of phosphoric acid which in the absence of Lime combines with the Iron and Alumina in which form it is very insoluble. On the other hand were lime present it would combine with the Phosphoric Acid in which form it is more available as a plant food.

"The way lime acts with the Potash compounds is equally marked. The soil water being charged with carbonic acid dissolves the lime and carries it down through the soil where it acts upon the double silicates of Potash and Aluminium, Lime being substituted for the Potash and going into solution. The extent of the action of course will depend on the amount of lime present.

" As I said before the soil needs a base for the organic acids to combine with. This is especially so where artificial manures are used and only when the carbonate, hydrate, or oxide of lime is applied can this purpose be effected.

" Periodical liming of soils is necessary because of the gradual removal of the Lime from the surface layers by solution as bicarbonate by means of the carbon dioxide produced by bacteria in decaying organic matter. The analyses of drainage waters show that every soil loses its lime more or less rapidly.

" Lime is also lost by combining with the Nitric Acid produced by bacterial activity to form Nitrate of Lime. This is soluble like other nitrates and is distributed through the soil in the soil water. When not taken up by the growing crop it ultimately finds its way into the drains.

" Again when a fertiliser like Muriate of Potash is added to the soil the Potash becomes fixed in the soil and a corresponding amount of Muriate of Lime is lost in the drainage water.

" These losses explain the need of the periodical liming of soils.

" If we take other compounds of lime like the phosphate, superphosphate, or sulphate of lime they are either acid or neutral and do not supply the required base. I have had the question asked me on one or two, occasions whether by applying Basic Supers or any other combination of lime with phosphoric acid it would obviate the necessity of periodical liming. My answer is emphatically no. There is nothing known at present in Agriculture which would take the place of lime and do the same work so effectively; and until something is discovered to the contrary we must abide by it.

" In Scientific Agriculture lime is classed as an 'indirect fertiliser'—indirect because (1) It is not a plant food in itself (2) It brings about the solubility of more important salts which are direct plant foods and therefore termed 'direct fertilisers,'

" Before I conclude I would like you to clearly understand two important points:—(1) That the action of Lime is partly physical by affecting the texture of the soil. (2) Partly chemical by neutralising acidity, and bringing into action reserves of plant food.

" Planters are usually impatient when they apply lime to see the immediate effect upon the crops. Lime is very slow acting as far as crop is concerned; but on the other hand it is not really so when you come to consider the work which it has to do, a small portion of which I have endeavoured to briefly describe to you.

" To show a real beneficial effect upon crops, lime takes from 1—2 years and even longer, according to the state of the soil to which it is applied. Consequently, those who expect to see the crops benefiting after, say, 2 or 3 months, immediately jump to the conclusion that it has done no good and how often the remark is heard " I see no good effects from liming." The manure applied in the following year is generally a rich nitrogenous one, and when next crop time comes round the remark is heard " I have got a splendid crop this year," and generally if you ask what that is attributed to, the answer is " the Nitrogenous manure applied." The liming that was undertaken in the previous year has been forgotten. In my opinion however most of the increase on former years of that " splendid crop " is due to the beneficial effects of the previous year's liming.

" I ask you, when you apply lime to think what its action is going to be and to show a little more forbearance and not to be in too big a hurry to see the desired effect. In agriculture patience is everything and very often sorely tried.

" In connection with the subject of this paper Planters should read the following articles which have been published in the *Planters' Chronicle.*

" Scientific Officer's Papers, No. 9 in Vol. IV, and No. 99 in Vol. VII.

" The best form in which to apply Lime is Water Slaked Lime. This has a markedly alkaline reaction and hence quickly neutralises any acidity which may exist in the soil. It also acts quickly in liberating plant food particularly Nitrogen.

" The use of Lime which contains a large percentage of Magnesium should be avoided. Magnesium Salts when present in excess may exert a toxic action on plants, and the relative proportion of Calcium and Magnesium determines whether or not Magnesium is toxic.

" Approximate equivalent quantities of some of the common forms of Lime when fairly pure are:—

Quick Lime	56 lbs.
Water Slaked Lime	74 lbs.
Air Slaked Lime and Limestone ...	100 lbs.

" The Lime should be water slaked and *not* air slaked. In the latter case the Lime combines with the Carbonic Acid gas in the air and forms Carbonate, the condition from which it was originally burned."

TEA.

Fermentation and Micro-Organisms.

The following appeared in the *Englishman* of 19th September, 1912:—

" About a year ago several important publications were issued by the agricultural department in Java. One of them, the most important to tea planters, dealt with fermentation. The author, Dr. Ch. Bernard, in introducing the subject stated that he could not definitely state that his theories had been proved, beyond doubt, to be correct and that his report was preliminary only. He intended to continue investigations, the nature of which he informed his readers. No further publication has since come to my notice but the subject is such an important one and in the event of his theory being proved to be right it will completely upset the ideas supplied by our Science Department through Dr. Mann and accepted by scientifically-minded planters, that a brief synopsis of the article may not perhaps appear out of place. So much occurs in tea to occupy a man's thoughts that it is likely, that the remembrance of Dr. Bernard's theory, pregnant as it is, with possibilities of far-reaching results which besides reducing considerably the time required for manufacture may also influence the quality and flavour of our teas, has faded from the minds of many who gave it no more than a brief passing notice.

THEORIES.

" He commences with a *resume* of the three theories which have, at various times, been advanced regarding the fermentation of tea. They are:—

1. " The chemical theory:—That the fermentation of tea is oxidation pure and simple *i e.*, the cells having been broken the oxygen of the air combines with the properties in the leaf.

2. "The enzyme theory:—That tea fermentation is caused by a soluble ferment or enzyme which exists in the cells of the leaf and which on being set free during rolling causes the oxidation of the tannin.

3. " *The micro-organism theory*:—That fermentation is caused by soluble enzymes which do not exist in the cells of the leaf but in those of micro-organisms.

DR. H. H. MANN'S THEORY.

" Of these three the enzyme theory is is most favoured by experts, and Dr. Mann and other scientists have isolated an enzyme known as an oxydase, (*i.e.*, an enzyme that causes oxidation) from leaf. Dr Mann demonstrates the great part which this enzyme plays in the manufacture of tea. The quality of the finished article being determined by the percentage of enzyme in the leaf. He also considers it to have some influence on flavour. This enzyme is supposed to exist in the cells of the leaf, and in fermentation causes slight oxidation of the tannin, causing the latter to give up some of its water and to be separated from the sugar with which it was combined. This oxidised tannin has by now assumed a brown colour and combines with the other materials in the leaf and so causes fermentation. He claims to have proved that this oxidising enzyme is the principal and probably the only active agent that causes fermentation, and that living organisms (microbes) take no part in the process, the only microbes present during manufacture being harmful ones, their numbers being determined by the degree of cleanliness of all processses up to the time the leaf enters the drier. He and other investigators advanced the following arguments as proof that micro-organisms play no part in the fermentation of tea. 1. That leaf in the presence of chloroform fumes which kill living organisms still ferments. 2. The same occurred when an antiseptic substance, known as salicylic acid, was applied. 3. That fermentation takes place so quickly that micro-organisms cannot in such a short time develop to a sufficient extent to take part in fermentation. The first two have since been withdrawn as it was found that in both cases not only the harmful bacteria was destroyed but also the enzyme or whatever soluble or organised ferment was present. The second is but supposition and will be referred to later on.

DR. BERNARD'S THEORY.

"The micro-organism theory brought forward by Dr. Bernard has received at times a certain amount of support from scientists. He claims to have isolated from the micro-organisms always present on tea leaves one which develops during the process of tea manufacture and which causes flavour. He obtained cultures of these by pressing juice from fermented leaf and sterilising. He states that the addition of these cultures to fermenting leaf accelerates fermentation, and that by colleoting juice from under the rollers and fermenting for 24 hours, the addition of this juice to fermenting leaf increases the speed of fermenation, and also improves the flavour. In some factories in Java fermentation proceeds much quicker than in others, in some taking 6 or 7 hours whilst in others only half an hour (exclusive of rolling) and in a few the leaf goes direct from roller to drier. Fermented leaf from factories where quick fermentation is the rule, has been placed on the floor of the fermenting room of factories where the process has been taking place slowly—the result being that almost immediately equally rapid fermentation occurred in both factories, caused evidently by a transference of an organism from the leaf to the floor on which it was placed.

DR. BERNARD'S RESULTS.

"The following extract from Dr. Bernard's article shows the results obtained by transferring fermenting leaf from one factory to another:—" At the Malabar concern the time taken for rolled tea-leaf to ferment completely was formerly four hours. Suddenly a change took place and hereafter the finest part of the rolled leaf was not generally put to ferment when it came out of the "ball-breakes," but was put directly into the drier. The coarse leaf was merely fermented for half an hour."

" ' At the factory Tanara, where formerly some hours were required for fermenting, this process at present takes (after bringing over the fermented leaf from the Malabar concern) just as long and what is better just as short a time at the last-named factory. Also at the Wanasoeka concern very long fermentation took place 6 or 7 hours, Leaf was brought also from Malabar with the same result as at Tanara.'

"The number of colonies of this micro-organism is much greater on the leaf of gardens where quick fermentation is the rule than on that of gardens where the progress is slow. Experiments on leaf at all stages from the commencement of withering to the conclusion of manufacture revealed the fact that the micro-organisms are increasing during the whole process. The fact that the micro-organisms increase during the 20 to 30 hours required for manufacture and in the withering process very rapidly would appear to eliminate the objection of want of time for development of the micro-organisms during fermentation.

"With cultures obtained from fermenting leaf harmful bacteria, which leads to the formation of a darker brown, oxidation product of the tannin, which is completely insoluble in water and whose formation rapidly reduced the colour, pungency and body of the liquor, was also found but only in very small quantities under normal conditions but in over-fermented leaf in much greater numbers. After 24 hours there being more bacteria present than micro-organisms and in eight hours the leaf was in a state of putrefaction. As a result of experiments *re.* the percentage of harmful bacteria Dr. Bernard states that he can say with certainty that by the time fermenting leaf becomes sticky the process has gone too far—that harmful bacteria have had time to do considerable harm.

"On hill gardens a large development of the micro-organisms, consequently quicker fermentation can be obtained by keeping juice for 24 hours and applying it to the rolled leaf of the following day. In the plains, however, tea juice cannot be left for 24 hours without harm.

POSSIBLE RESULTS.

"As to the possibilities of this theory turning out to be correct is a question best left to those with a better understanding of the scientific side of the matter but I think that Planters would be pleased to hear of its undoudted proof. We have no gardens, the leaf of which ferments in such a short time as is apparently the case in some factories in Java but at the same time the time required varies considerably from three to. in some cases, as much as six hours from the time the leaf enters the roller. Rapid development has usually been regarded as a sign of good quality, whilst difficulty in obtaining the colour required has indicated poor quality. Can it possibly be that these micro-organisms of which we at present know little are responsible for quality? Java planters have not up to the present, distinguished themselves as producers of anything approaching first class teas but there may be other factors such as soil, methods of plucking and manufacture which prevent this consummation.

DEDUCTIONS.

"At present the following points as a result of these investigations are worthy of note! firstly, that fermentation must be stopped before the leaf becomes sticky, *i.e.* before harmful bacteria have had time to do much harm; and secondly, that if this theory turned out to be correct, even then the advice so persistently given by Dr. Mann as regards absolute cleanliness in all stages of manufacture in order to keep harmful bacteria in check must be strictly followed. It was found that by taking samples of juice with a damp wad from fermenting trays and floors that had not been kept scrupulously clean that a larger number of harmful bacteria were found than of micro-organisms, showing the necessity for scalding or steaming daily."

In commenting upon this article the *Indian Planters' Gaxctte*, points out that the 'deduction' is contrary to experience found in practice, and the cleaning and sterilising of Tea factories has been found by several who have tried it to result in low quality tea at once.

COOLIE IMIGRATION IN CEYLON.

A statement of arrivals and departure of imigrant coolies during the month of August 1912 published by the "Ceylon Observer" for the first eight months of 1912 together with the figures for the corresponding month and period of the previous year; and shows a balance of arrival over departures of 5,538 in 1912. It would be interesting to know if these Imigrants are all from Southern India, but this is not given.

RUBBER.

Thinning out of Rubber Estates.

It may be remembered that an experiment carried out on Periyar Estate on this subject was reported in the *Chronicle*, Vol. VII p. 142, and that the conclusion arrived at was that cutting out every alternate tree is the best method of thinning a thickly planted estate and pollarding is not a success. The following article appeared in the *India Rubber Journal* of September 7th:—

"Quite a large number of estates are now commencing tapping operations, and are therefore in possession of trees four years old and upwards. A large proportion of these areas were planted in 1906, 1907 and 1908 in the respective countries, and the problems now before planters are of a varied character. In Ceylon, where, owing to soil and elevation, the trees were planted closer than in Malaya and Sumatra, some 60,000 acres were planted in 1906 and 50,000 acres in 1907; in fact those were the most active years of rubber planting in that island. Frequent distances at that period were 15 by 15 feet, or 20 by 10 feet; these represent spacings which would be properly described as close planting in Malaya or Sumatra, but they are not necessarily so on poor soil at an elevation of 1,000 feet and over above sea level. It is only when the trees, in Ceylon, reach their sixth or seventh years that thinning out on a large scale is forced upon planters; elsewhere on estates where the same distances have seen adopted thinning out has been commenced at a much earlier age.

"In Malaya, as in Ceylon, large areas were opened in 1906, 1907 and 1808. In 1906 the acreage was 99,000, in 1907, 179,000, and in 1908 241,000 acres. The distances adopted in those years were a little wider than in Ceylon, popular spacings then being 12 by 24, and 18 by 18 feet. The same applies to Sumatra, except that many of the estates then being under Liberian coffee, a wider distance, especially 20 by 20 feet, was commonly adopted.

ACREAGES REQUIRING THINNING-OUT.

"The broad fact remains that in Ceylon there are about 100,000 acres, and in Malaya and Sumatra a further 200,000 acres which are now covered with trees, the branches and root systems of which are in frequent contact and already competing with one another for light and soil. During the next year or so the problem of thinning-out must be faced: otherwise there will be a gradual reduction in yield of rubber consistent with a slower rate of growth of the whole plant and poorer bark renewal.

"The problem can be easily settled by those parties who would simply reduce the number of trees by half; but such a policy would, on many estates, be unscientific and extremely wasteful. Thinning-out must be taken in hand only after the fullest consideration has been given to distances, soil, climate, diseases, storms, past tapping, manuring and general methods of cultivation. We will therefore study the methods generally adopted and the importance of some of these factors.

METHODS NOW ADOPTED.

"Let us first admit that thinning-out must be done now or in the near future. Where thinning-out is resorted to on young areas the plants can be easily uprooted and destroyed, since the quantity of rubber obtainable from the stumps (or first eight feet) does not come into serious consideration. This is by far the most preferable course, and should in Malaya and Sumatra be done when the trees are about three years, and in Ceylon when they are about one year older. At the ages indicated the remaining trees can usually be expected to give a fair cover to the ground and to rapidly throw their roots into soil set free during the thinning-out process.

"On old estates the quantity of rubber obtainable from the stumps of trees being thinned-ont is quite considerable and immediate uprooting and destruction is therefore not generally deemed advisable.

"On both young and old estates, and especially the latter, there are two methods available. The first is by cutting out all the trees in every alternate row; the second by removing only the backward trees. The first method is the easiest, most drastic, and most heart-breaking; it is based on the idea that in thinning-out half the trees must be removed. If an estate were closely planted and showed very even growth it would be perfectly justifiable; if the reverse conditions prevailed, then it is quite conceivable that complete good rows may be removed and bad ones retained, or that those lines of trees removed might posses the best trees on the estate, and those retained the worst on the property. Where the estate is not even, or where there is liability to death by various causes, thinning-out by the second method—removal of backward trees—seems to be the most sensible one to adopt.

HOW MANY TREES PER ACRE.

"But even this policy has its limits. It is quite obvious that there is a minimum number of trees per acre to be kept in view. And he is a very wise man who can hit off that number. Our view would be to ultimately thin-out down to about eighty or ninety trees per acre; this would naturally be still further reduced from year to year through diseases, storms, bad tapping, etc. Diseases would be the most potent factor in effecting reduction later on, the thinning-out process being of such a nature as to encourage the spread of fomes and white ants. On an estate known to the writer the deaths amount to from 5 to 7 per cent. per annum; the percentage common to young estates would probably be maintained or exceeded in the first two or three years following thinning-out.

"While it is hardly fair to expect planters and experts to maintain the same views for all time, we certainly feel justified in giving publicity to the opinions expressed by such men as Malcolm Cumming, Francis Pears, and Gallagher.

"Cumming believed that close-planting would, during the first few years, give more rubber per acre than wide-planting.

"The late Francis Pears states that "an acre of rubber with 50 trees is likely to prove more valuable than one with 200." It will also be remembered that Wickham advised 40 trees per acre as against Berkhout's 300.

"Gallagher estimated that on virgin jungle (and from 15 to 20 per cent. of the trees originally planted would be lost by the time the trees were seven years old. He recommended commencing with 120 to 140 trees per acre, in order that about 100 trees per acre might remain at seven years.

MANURING AND THINNING-OUT.

"While every planter must now admit that close planting checks the growth after the fourth or fifth year, on fairly good soil, and that the original cannot be the final distance on estates planted only with Hevea trees, we doubt whether the actual value of manuring has been taken into full consideration. It has a direct bearing on the age at which Hevea estates should be thinned. There are many estates which, being closely-planted and therefore renewing their bark slowly, could be assisted by the application of manure. On many estates which have been too severely tapped the application of manure has been followed with a more rapid bark renewal; on close-planted estates a similar effect should be obtained. In such cases it would be advisable only to manure those trees intended to permanently occupy the land. Again, one might support a larger number of trees, per acre, by proper manuring.

HOW THINNING-OUT IS DONE.

"When we come to the actual thinning-out process we find that either the plants are felled near the ground and the stump and roots extracted, or the tree is cut off at a height of about eight feet. Where the basal part of the trunk is retained it is customary to tap this drastically and finally uproot. In one or two years a few pounds of rubber are obtained from each stump. Special gangs of inferior tapping coolies are usually entrusted with such work, it being desirable to employ only the best coolies for tapping the permanent trees. The writer has seen many stumps treated in this way and has been struck with their manifestations of vitality under such adverse circumstances; even though the stumps are densely shaded by the foliage of the surrounding trees, they may throw out numerous branches at the top, which, if allowed to grow, would probably give the plants another lease of life. If, however, thinning-out is to be done properly all such stumps must be uprooted, all roots removed, and every particle burnt immediately. It is true that by allowing stumps to retain branches the plants are kept alive and the risk from disease for the time being postponed; sooner or later all traces of the trees so treated must be removed and destroyed.

This article was submitted to a number of leading directors and planters and their comments are given in the *Journal.*

Most of the commentators appear to agree that the number of trees to be finally aimed at is 90 to 100 per acre or even less. Another recommendation given by several men is to only cut out alternate trees or lines of trees if the growth is even. Where it is uneven selection should be adopted cutting out backward trees first and then those diseased or with burrs. Again most planters appear to agree that uprooting and burning should be done though all are not agreed about the value of pollarding and tapping the stumps to death first. Mr. E. G. Windle says he would begin by taking out backward trees and then by judicious selection. It is evident that on this system the lining could not be kept to but this does not much matter. "As to the average number of permanent trees per acre to be aimed at" says Mr. Windle "I would put this at 50 and would aim at arriving at this number when the plantation was say 12 years old commencing thinning at 6 to 6½ years. This would only mean a reduction per acre of 10 per cent. per annum. The above may appear too slow a process from the point of view of the best development of the trees, but is, I think, a reasonable compromise between development and dividends.

THE BRITISH NITRATE SUPPLY.

Dr Samuel Edy of Christiania gave an address before the International Congress on the "Artificial Production of Nitrogen from the Atmosphere." In his remarks Dr. Edy said "with all his strength in the event of war, Great Britain can be put out of Commission by simply cutting off the supply of Nitrates (essential impedient for explosive) from Chile.—*Times Weekly Edition.*

The Planters' Chronicle.

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(INCORPORATED.)

Scientific Officer's Papers.

CIX.—PREVENTION OF THE INTRODUCTION OF INSECT PESTS AND FUNGOID DISEASES OF PLANTS.

[*Concluded.*]

The last phase of the general problem is how to stamp out diseases when they have been confined to certain districts, and this is the most difficult of all. It is here that the Pest Act proper comes into operation. Pest Acts exist in many countries for dealing with specific diseases and bad weeds. Thus in Trinidad and Grenada laws are in force to provide for the control of pests and diseases within the island. In Bermuda an Act was introduced in 1907 requiring the destruction of all fruit in the island for two seasons in order to bring the Fruit Fly (*Ceratitis capitata*) under control. In England under the Board of Agriculture's orders compulsory pruning of Gooseberry bushes in Kent has been enforced and compulsory spraying of fruit to deal with the American mildew which made its appearance some three years ago. Compulsory uprooting and destruction of plants is not insisted upon, but many growers have voluntarily grubbed out infected fields. This shows the trend of such legislation. It does not necessarily resort to such drastic measures as was suggested at the Annual Meeting this year, and an estate is not uprooted and burned, but reasonable methods of a curative and protective nature recommended by the Agricultural authorities are insisted upon.

Any Pest Act introduced into India would probably follow the same lines and would depend for its success largely upon co-operative and voluntary action of the planters concerned for the ultimate good of the whole planting community.

The Green Bug in the Nilgiris is usually taken as the standard case. A Pest Act introduced to deal with this would probably insist upon spraying or washing methods being adopted on every estate suffering from the disease, and would not allow the total abandonment of diseased coffee to act as nurseries and infection points for the spread of the disease. Only estates which refused to adopt any preventive or curative measures would be compelled to uproot and destroy the diseased plants.

The difficulties would be many as is only natural. One great difficulty is the fact that the Green Bug is present on the shade trees and also on many of the jungle trees and that many estates are in boundary over long distances with Government forest. Here the co-operation of the Forest

Department would be needed and it is possible that where estates were in boundary with forest, belts might be felled and planted with some tree which is not attacked hy Green Bug and is of value as a timber and these belts kept as free as possible from weeds. The estate boundaries could then be sprayed and watched.

The working of a Pest Act necessarily entails expense both on the part of the Government introducing it and on the planters, and it needs sensible co-operation between both parties. The point to be decided is whether the value of the industry it is aimed to protect is worth the expense and the temporary hardships to be incurred, and it is reasonable to suppose that both are temporary and that the Pest Act if properly worked will eradicate the disease and thus finally benefit the country and the community monetarily.

A Pest Act is in existence already in Indta in the progressive State of Travancore where it is aimed at stamping out the Cocoanut Palm disease which threatens to destroy a most important industry. The following account of this Act, which is really a voluntary co-operative measure between the Government and the planters, is taken from the *Madras Mail* (July 12 1910) and it affords an excellent example of a voluntary co-operative measure between the Government and the planting community which might well be followed in other parts of India.

" The Government of Travancore have issued an order regarding the palm disease in Travancore, with special reference to the Conference held at Kayankulam on May 6th last, with a view to determine the best measures to be adopted for combating the disease, from which we take the following extracts.

" In view of the preparedness of the ryots generally for further action, and the recognition by them of the necessity to cut down, without further delay, diseased trees which are pronouuced irrecoverable by the Agricultural Department, His Highness's Government think that vigorous action may now be taken to cut down all such trees. In regard to the supply of lime and cocoanut manure, His Highness's Government are of opinion that it would be well to establish a number of Depôts at accesible places, not more than one or two miles away from one another. The Agricultural Department should be in charge of the Depôts and should issue the various things at cost price and for cash ordinarily. Discretion may, however, be given to the Inspector in charge of the operations, to issue the things in any specific case. on credit, provided that the officer is satisfied that the ryot is not in a position to pay cash, and provided also that the latter agrees to pay for what he receives in instalments, not exceeding six, with his kist. The collection of the value should, in that case be made by the Tahsildar and remitted to the Agricultural Department. The prices fixed for the things supplied should, if possible, be slightly lower than the market rates, so as to offer a premium for utilising the manures.

" In regard to the assessment on the trees which may be cut down, His Highness's Government hereby notify, for the information of all the ryots that, after all the felling is done, it is open to any ryot to ask for a re-enumeration and that the settlement assessment will be revised if necessary. His Highness's Government also cousider that the local staff of the Department should be sufficiently strengthened, so as to make visits to affected gardens and gratuitous advice easy. Much will depend upon the readiness with which the officers of the Agricultural Department comply with the requisitions for advice, for visits and for manures, A small area should be given to each subordinate, so that it may be ascertained, after some time, what exactly he has been able to do.

" His Highness's Government further consider that it would facilitate work if small Local Committees are organised to help the Aricultural Department in securing information and the co-operation of the ryots, and for acting generally as intermediaries between the Department and the ryots. The local committees should, when formed, be in a position to give useful advice in regard to the circumstances of applicants for manure, who may ask for credit, etc. A strong local committee will probably also be able to bring more pressure to bear upon a recalcitrant owner of hopelessly diseased trees than the Sirkar officers could. The local committee should be elected by the ryots themseles. The Department need only recognise them and utilise them. At the outset it may probably be necessary for the Tahsildar to co-operate with the Director of Agriculture and convene a meeting of the ryots in an informal way to organise the Committees. The Dewan Peishkar, Quilon, is requested to pay his personal attention to this matter. He should submit a report to Government as soon as each Committee is organised, with information as to the names and status of the members."

" Certain proposals submitted by Dr. Kunjen Pillay, Director of Agriculture, in connection with the above have been sanctioned for a year, with effect from the 1st. Karkadagom, 1085. A lump sum of Rs. 8,000 has also been provided in the Budget for 1086, on account of the pay of the temporary staff now sanctioned, the cost of erecting the necessary sheds and for other contingent charges. In regard to the advance of Rs.10,000 asked for by the Director, the Account Officer is to be requested to provide under " Debt heads " a sum of Rs.2.000 for the rest of 1085, and Rs.8,000 for 1086."

RUDOLPH D. ANSTEAD.
Planting Expert.

CHEMICAL WORKS IN BOMBAY.

Bombay is on the eve ot an important industrial development. A scheme is being pushed forward for the establishment of large chemical works for the manufacture from sulphuric acid of a large number of products dependent on this acid. The intention is to take the raw materials of the country, which are now being exported or not used at all, and convert them into fertlisers or chemical products used by the textile trades of Bombay. H. E. Sir George Clarke, who recently referred in a speech to the advantages of chemical fertilisers, is taking a great interest in the scheme. It is altogether a new development for Bombay but it will not be the first large heavy chemical industry that has been established in India. for Messrs. D. Waldie and Co.'s chemical works, in Bengal, have been in existence for very may years. The advantages to Bombay will be the production of cheaper chemicals for the textile trade and the manufacture of fertilisers. The saw materials will be obtained from Bombay and other districts. There is an enormous field for chemical fertilisers in India as farmers will realise when they are educated on these points. Ceylon, Java Japan. and China are already large consumers of chemical fertilisers and appreciate their value. Mr. H. N. Morris, Chairman, Chemical Factories at Manchester and Cheshire, who has been in Bombay for several months making arrangements for the erection of a chemical fertiliser factor, is returning to England, but will return in February or March, when the new works are expected to be ready to start,—(*Indian Planter Gazette*).

THE SCIENTIFIC DEPARTMENT, U.P.A.S.I.

Bees and Coffee Fertilisation.—At the Annual Meeting it was decided to remind the Government of Madras of their promise to allow the Government Entomologist to investigate this matter. It appears, however, that it had not been forgotten and Mr. T. Bainbrigge-Fletcher has now made arrangements to pay a preliminary visit to the Shevaroys. He arrived there on the 14th October, and will get an idea of the local conditions and make plans for any necessary experiments. As the Coffee is in blossom for such a short time a plan of action must be decided upon sometime beforehand. It is hoped that Mr. Fletcher will pay a similar visit to some Mysore estates at the beginning of next month. In connection with this subject the following extract from *Nature* of 19th September is of interest:—

"Mr. Cecil H. Hooper has contributed to *Irish Gardening* for June and July an account of some interesting experiments on the pollination of hardy fruits, made by himself, Mr. F. Chittenden, and others. These experiments were made in order to ascertain whether fruits can set and mature without the aid of bees, whether mature fruit can be obtained by pollination with the pollen of the same variety or the same flower, and whether better fruits result from pollination with pollen of another variety. It was found that gooseberries and currants, raspberries and loganberries, though freely self-fertile, set better fruit when visited by bees ; that strawberries are apparently to some extent wind-pollinated, though this needs confirmation. As is well known, more or less complete self-sterility is common among the many varieties of cherry, plum, apple, and pear ; in the majority of cases pollen from another variety is essential for fruit formation. Details are given of numerous interesting results obtained by covering otherwise untouched flowers with muslin bags, by brushing with pollen from the flower's own anthers, or from those of other plants of the same variety, and by pollination with pollen from other varieties. In connection with the interplanting of different varieties in orchards, lists are given according to the times of flowering. The author estimates that about 80% of the pollination of hardy fruits is done by the hive bee, about 15 per cent. by the various humble bees, and the remainder by miscellaneous insects."

Scientific Assistant for Coorg.—Mr. L. G. Jonas, who has been appointed Scientific Assistant for Coorg, sailed in *s.s. Simla* on 28th September and will come direct to Madras, where he is due on 26th October. A meeting is being arranged at Mercara on 7th November to meet and welcome Mr. Jonas, and the Scientific Officer will probably accompany him and formally introduce him to the Coorg planters and his district. Mr. Jonas has been undertaking a special course of study in England during the last three or four months to specially fit him for his work in Coorg. He has been studying Fungi with Mr. Massee at Kew, and has also spent some time at Rothansted, as well as working at practical agricultural chemistry in a London laboratory. He has also been enquiring into the subject of the quality of coffee in the London market and is bringing out a specially put up series of samples of all the different grades.

Scientific Assistant for Mysore.—The Scientific Officer and Mr. Frattini will meet the Council of the Mysore Planters' Association at Chickmaglur on 22nd October to discuss and arrange a programme of work for the Assistant over a period of the next twelve months. It has been arranged that Mr. Frattini should occupy the bungalow at Goorghully, near Saklaspur which has been lent by Mr. Hayward. This bungalow is in a healthy situation out in open grass land, with the estate close at hand. It is within easy reach of Mudigere, Saklaspur, and Belur, and about 20 miles from Chikmaglur across country.—K. D. A.

DISTRICT PLANTERS' ASSOCIATIONS.

Coorg Planters' Association.

Minutes of a General Meeting held in the Bamboo Club, Pollibetta, on Thursday October 3rd, 1912.

PRESENT.—Messrs. Maclean, Hume, Shaw, Breithaupt, Mahon, Tweedie, Graham, Garrett, J. W. Finlayson, A.B., Chengappah, Gerrard, Hamilton, Bracken, Tipping, A. Bopannah, and W. M. Ball, Honorary Secretary.

The Honorary Secretary in the Chair.

Government of Coorg.—Mr. Jackson, in opening the subject read his letter to the Honorary Secretary bringing to his notice the fact that there was an agitation on foot to ask to have Coorg placed under the Madras Government and pointed out the many disadvantages Planters and the Province as a whole would be under should Coorg become a small Collectorate of Madras, and proposed the following Resolution which was seconded by Mr. Graham and carried *nem. con.*

"That in the event of there being any proposal to place Coorg under the Madras Government this Association trusts that nothing would be done in the matter until It has had an opportunity of placing its views before the Government of India.

"It was also resolved that a Sub-Committee be appointed to draw up a letter to be circulated among the leading residents both Coorg Indian and European stating the case of the Association and asking their support against any such scheme. The Sub-Committee to consist of Messrs. A. H. Jackson, A. Bopannah and the Honorary Secretary.

The Visit of H. H. The Maharajah of Mysore.—The Honorary Secretary pointed out that H. H. was expected to visit Coorg, as the guest of Sir Hugh Daly, K.C.I.E., C.S.I., about the 3rd or 5th of November. On the motion of Mr. C. G. Maclean it was resolved that a deputation consisting of the President, the Hon. Secretary, Messrs. Graham, Jackson, Mahon and A. Bopannah do call on H. H. the Maharajah and welcome him to Coorg on the part of the Association.

U. P. A. S. I. Meeting.—The Honorary Secretary explained that no report had been drawn up by the delegates as the proceedings were so fully reported in the *Madras Mail* and the *Planters' Chronicle* but that their delegates were now present and would be pleased to answer any questions. He also reminded the Members that one of their delegates had been elected Vice-Chairman of the U. P. A. S. I. and called for a vote of congratulation to Mr. Mahon on his election. This was most cordially given and Mr. Mahon briefly replied in acknowledgment.

The Honorary Secretary reported that through the kindness of Sir Hugh Daly, the Chief Commissioner, they had the opportunity of meeting Mr. W. H. Wood Senior Member of the Railway Board and pressing the claims of Coorg to a Railway. Mr. E. A. S. Bell, Engineer in Chief, Mysore State Railway Construction Department, was also present. Mr. Wood gave the delegates a sympathetic hearing but said it would be necessary for them to bring up a practical scheme for financing any proposed Railway.

Mr. Jackson asked about the working of the Planters' Benevolent Fund and the Honorary Secretary explained things as far as he knew and promised to write to the Secretary, U.P.A.S.I., and ask if any report had been published. After a short discussion on other matters Mr. C. G. Maclean proposed a hearty vote of thanks to the delegates for all the trouble they had taken, this was seconded by Mr. Bracken and carried *nem-con.*

Labour.—The Honorary Secretary called the attention of the meeting to Mr. Barber's scheme for the registration of maistries and referred members to that week's *Chronicle* for an explanation of the same and asked them to bear in mind that their delegates to the next Meeting of the U. P. A. S. I. would require instructions on the subject. Mr. Mahon briefly explained what the Sub-Committee of the U. P. A. S. I. of which he was a Member, had to do, and though there was such difference of opinion the meeting on the whole was in favour of an attempt being made to devise the workable scheme. In consequence of a resolution passed at a meeting of the Committee the Honorary Secretary brought up the subject of the rates paid for daily labour. After a long discussion Mr. Graham proposed that the Honorary Secretary do write to all Members asking them what rates they paid to coolies on the Check Rolls. In moving the Resolution, Mr. Graham explained that he only did it to prevent coolies circulating exaggerated reports in the Bazaars. The resolution was seconded by Mr. Tweedie and carried.

Letter from the District Magistrate was read regarding the extension of time in which a warrant would be granted. Resolved that the letter be printed and circulated amongst Members. Mr. Maclean complained that under a new ruling the Subedars were now refusing to grant hand warrants. Mr. A. B. Chengappa proposed and Mr. Mahon seconded that the District Magistrate be asked to rule that the Manager of the Estate be a valid witness to thumb impressions of Kurumbers and Yeravars. Resolved that the Honorary Secretary do call the attention of the District Magistrate to both the above matters.

General.—Read letter from the Commissioner *re* the Cannanore Ghat Road dated 9th August. Many members complained that the road was still in a very bad state. Resolved that the Honorary Secretary do again write to the Commissioner on the matter and ask him to point out to the Executive Engineer how necessary it was that this, one of the few outlets from the Province, should be put in good order before the crop season, now approaching, commenced.

Mr. Tweedie proposed and Mr. Mahon seconded that the local Government be addressed on the subject of the speed of Motor Cars and suggest that a speed limit be enforced where necessary especially on the Ghats.—Carried.

Read letter from the Director of Telegraphs, Madras, *re* alteration of hours at the Pollibetta combined Office.

Read letter from Mr. Anstead, Planting Expert *re* a visit to Coorg of Mr. T. Bainbrigge-Fletcher, Madras Government Entomologist. Resolved that this Association will be very pleased to see Mr. Bainbrigge-Fletcher and a tour will be arranged for on receivlng the dates of his proposed visit.

Read letter from Mr. A. B. Chengappah *re* the concession of 10 acres free of assessment to bane landholders. From Mr. Graham *re* payment of Police for escort to money coolies. These matters to be enquired into by the Honorary Secretary.

District Fund Board.—Mr. A. H. Jackson explained what had been done about the Kerala Road Bridge and also about the Pollibetta-Sidapur Road which project appears unfortunately to be at a stand-still owing to a difference of opinion as to the right trace. Mr. Mahon proposed and Mr. Tipping seconded a vote of thanks to Mr. Jackson for all the trouble he had taken in the matter.

With a very hearty vote of thanks to the Chairman the meeting closed.

(Signed) W. M. BALL, *Hon. Secy.*, *S. P. A.*

Malabar Coast Planters' Association.

Proceedings at the Half Yearly Meeting held at the Malabar Club, Calicut, on 14th September, 1912.

PRESENT.—Messrs. E. Lord (Chairman), T. Martin, V. H. Travers Drapes, Campbell Hunt, H. C. Plowden (Hon. Secretary). *Visitors*: Messrs. W. O. Wright and G. Dunning.

The Notice Calling the Meeting having been read, *the Minutes of last Meeting* were taken as read.

The Chairman on opening the Meeting said.—" I very much regret to see such a poor attendance ; this is the first meeting held under the resolution passed at the last General Meeting limiting meetings to 'two a year instead of quarterly as before and I was in hopes that we should have had a good representative attendance.. Owing to the Estates comprising this Association being so scattered, a certain amount of trouble and loss of time is no doubt occasioned in attending meetings, and some members may not consider the meetings worth it but unless members are prepared to go to a little trouble and meetings are well attended all interest in the Association is likely to be lost, and the Association fall through. This would I think be a mistake, as a combined body would carry more weight than an individual if the time ever comes when any serious question arises, at present luckily very few of us have any grievances, but we never know when they may turn up.

" I do not intend to waste your valuable time with any further remarks. Various subjects will come up in due course and we shall then have an opportunity for discussing them."

Roads and Communications.—Read letter to Executive Engineer, *re.* bad condition of Alwaye Thattakad, and Muvatupuzah Thodupuzah roads. Mr. Lord mentioned that the matter had received the immediate attention of the Travancore Government, aud the roads were now in good order. Recorded with satisfaction.

Mr. Campbell Hunt drew attention to the bad state of certain roads in Malabar and proposed the following resolution which was seconded by Mr. Travers Drapes. " That the Honorary Secretary be requested to write to the President, Malabar District Board, Calicut, pointing out the bad state of road No. 114 especially from the 7th to the 12th mile stones and to the fords across two rivers on this road."—Carried.

After some discussion the Meeting was of opinion that it might be feasible to employ Government Motor lorries where several estates were grouped together provided that the rate charged did not exceed the present cart rate which is about 4 annas per ton mile, the question of roads and bridges would have to be gone into before anything could be decided. The Honorary Secretary was requested to inform the Secretary of the U. P. A. of the opinion of this Association.

U. P. A. S. I. Delegate's Report.—This was read and discussed. The Chairman proposed a vote of thanks to Mr. Plowden for the trouble he had taken in representing the Association at the abovementioned Meeting.—*Carried nem con.*

Refund of Rubber Exhibition Money.—Proposed by Mr' Martin and seconded by Mr. Travers Drapes that the Rubber Exhibition refund of Rs.332-8-0 be placed to the general fund ot the Association.

Finance.—Proposed from the chair, that the financial year of this Association be from the 1st January to 31st December.—Carried.

The Chairman said our Delegate to the U. P. A. S. I. has informed us that increased subscription is not required. Our present cess of one and a half annas per acre is sufficient to meet the expenses of this Association for the year.

Supply of Bulletins.—The question of supplying bulletins was discussed and the following resolution was passed proposed by Mr. Plowden and seconded by Mr. Campbell Hunt: "That this Association provide bulletins to Estate Managers and that the cost of them be charged to the general fund."

Lady Ampthill Nursing Institute.—It was pointed out by Mr. Lord that this Association did not subscribe to the Institute as an Association, but that private subscriptions were collected from members and remitted to the Honorary Secretary of the Institute, and that as under this method subscriptions had fallen from Rs.155 in 1910 to Rs.60 in 1911 and so far no subscriptions had been received this year, the institute was not getting the support it deserved. The Chairman then proposed the following resolution: "That this Association do join the Lady Ampthill Nursing Institute and pay an annual subscription of Rs.100 and that the Honorary Secretary be requested to write to the Honorary Secretary of the Lady Ampthill Nursing Institute asking that the Association be allowed to become a subscriber as from the 1st October on payment of a proportionate amount of the yearly subscription."—Carried.

Annual General Meeting.—Proposed by Mr. Campbell Hunt and seconded by Mr. Travers Drapes: "That the Annual Meeting of the Malabar Coast Planters' be held in February.—Carried.

Election of Planting Member of Council.—Resolved that this Association support Mr. Barber and that members be asked to vote for him.

After a hearty vote of thanks to the Chair and to the Honorary Secretary of the Malabar Club the Meeting closed.

(Signed) EDWARD LORD,
Chairman.

(„) H. C. PLOWDEN,
Honorary Secretary.

Up to the end of 1911 the capital sunk in rubber in the Malay Peninsula is given as £21,000,000 for sterling companies and £24,000,000 for dollar companies. The addition of Ceylon, Java and other companies brings the total to £77,917,000. This may be taken as a conservative figure including only actual planting capital and not Continental and American flotations. The area under rubber in Malaya is estimated at 540,000 acres, while 800,000 acres are alienated but not yet planted up. Some useful tables in an appendix afford further comparisons of the advance of the industry. In 1905 the acreage under rubber was 38,000 acres. The increrse each year varied from 47,000 to 70,000 acres until 1811, when an increase of 180,000 acres took place, the number of estates having risen from 254 in 1906 to 964, and the total area planted to 542,900 acres. The number of estate labourers at the end of 1911 was 227,985, of which 126,665 were Tamils. —*Commerce.*

RUBBER.

Synthetic Rubber.

Now that the controversy aroused by Professor Perkins' announcement shows signs of abating perhaps a brief resumè of the facts and opinions disclosed may not be without interest to the readers into whose hands this publication may be expected to fall.

The history of the subject dates back to 1860, when Greville Williams obtained from the products of the destructive distillation of rubber a product he termed isoprene, and observed moreover that this substance when heated with acids was partially re-changed into something resembling rubber in appearance.

The next explorer in this field was Bouchardet (1875) who obtained other products by heating caoutchouc, such as di-isoprene, etc., together with isoprene and came to the conclusion that they, and rubber itself, are polymers of isoprene, that is are primarily derived by the condensing or combining together of numbers of molecules of isoprene. The same worker also drew attention to the similarity of his di-isoprene to turpentine, a remark of great significance as subsequent events showed.

These researches paved the way for the noteworthy advance made by Sir William Tilden in 1884, who succeeded in preparing isoprene from turpentine—its first production from a substance other than rubber itself—and definitely foreshadowed the possibility of the commercial manufacture of the latter substance. He was not much more successful at the time than his predecessors in attemps to condense the isoprene but, eight years later, on examining the bottles in which it had been stored, found in them a substance having all the properties of natural rubber and like it capable of being vulcanized.

Little further progress however was made until several years ago, when the rapid increase in the price of the natural article began to direct the attention of chemists to the problem of its artificial production. Almost simultaneously apparently the question was taken up by Professor W. H. Perkin and by Messrs. Strange and Graham's chemists, under Dr. F. E. Matthews, in England, and by Bayer & Co., the Badische Anilin and Soda Fabrik, and Messrs. Sohering in Germany.

Isoprene naturally was the pivot on which the first experiments were based, to discover, if possible, a method by which it could be readily turned into rubber. The Bayer Co., after innumerable trials decided that heat was the most favourable reagent for effecting the change, and patented a process giving results fair but much inferior to the method shortly afterwards hit upon by the English chemists. In July 1910 it occurred to Dr. Matthews to study the action of sodium upon isoprene, so placing together these two substances in a tube he sealed it up and went away for a summer holiday. During his absence the isoprene, grateful perhaps for a respite from the violent treatments to which it had been so long subjected, allowed itself to become condensed to rubber, and the first important stage of the attack was accomplished.

The production of isoprene now became the dominating subject. First thoughts of course centred on turpentine, from which it had previously been obtained by Tilden, as a raw material. Further consideration however soon put this out of court, on account of the limited supply, of the wide fluctuations in price, and of the indifferent yields obtainable from it:

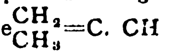
Any substance to be practicable as a raw material for rubber must be cheap and obtainable in enormous quantities, and must furthermore offer the possibility of production of the finished product at not more than 1/ per pound. Regarded from this stand-point the only substances worthy of consideration seemed to be coal, petroleum and starch.

From coal of course is produced coal tar, that universal provider to the organic chemical manufacturing industry, but this did not appeal to the English chemists as a likely starting out point. Their German rivals on the other hand, with greater fidelity, selected tar to work from and are now obtaining isoprene from it though in what quantities and with what degree of readiness has not been made public.

Petroleum was next considered and numerous experiments made with it but not with promising results.

There remained now only starch, and this being cheaply convertible by fermentation into lactic acid this line of research was investigated, with the result that although with great ingenuity a way of converting lactic acid into isoprene was discovered yet the series of reactions by which it is accomplished is so complicated as to be utterly impracticable as a commercial proposition.

How else then could starch be turned to service ? It can readily be changed into sugar, as is generally known, and this in its turn can be fermented and give rise to various products, the chief and best known of which is alcohol, and amongst them being fusel oil—a mixture of " higher" alcohols.

Now these higher alcohols, for various chemical reasons, seemed to form a promising base for further advance, and also it did not seem unlikely that improved means for obtaining them could be devised. So it proved. Taking for instance one of the amyl alcohols, $(CH_3)_2\text{-}CH—CH\text{-}_2—CH_2\text{-}OH$, it was converted by the action of Hydrochloric acid into amyl chloride, $(CH_3)_2\text{-}CH—CH_2—CH_2—Cl$, this by treatment with chlorine into a dichloride, $(CH_3)_2\text{-}CH—CHCl—CH_2—Cl.$, which when passed through a heated tube containing sodalime gave the hoped-for isoprene  $\begin{matrix}CH_2\\CH_3\end{matrix}{=}C.\ CH - CH_2$.

On these results a bacteriologist, Professor Fernbach, of the Pasteur Institute, was invited to join the group with a view to improving the means by which fusel oil is obtained, and after 18 months work his efforts in the discovery of new fermentation processes, affording a cheap method of obtaining acetone, a substance of great importance to the explosive and other industries, and of butyl alcohol, which when treated in the way described above affords butadiene and butadiene rubber. The isoprene yielding alcohol has apparently not yet been obtained in quantity, and work in this direction is proceeding.

From the yield as since given for each stage of the process it would appear that the resultant one, of rubber from potato, the source of starch, is not more than 8%, from which it may be calculated that to displace one acre of land under rubber cultivation nearly half an acre under potato would be required—of the high priced lands of Europe presumably. Hardly a satisfactory economic basis for the new industry to rest on one would think.

Such is an outline of the story detailed by Professor Perkin and the time having arrived when work on a larger scale became necessary, an appeal for funds had to be made, conditions in the British chemical industry being such, that no capital is available for experimental work.

The proposition, although based on all appearances sound prospects of being able to supply the worlds demand for both acetone and fusel oil, seems to have met with less support than one, say, for growing rubber in the Sahara would be expected to receive.

Criticism, directed mainly towards the slaying of the project, and ignoring that the question of rubber manufacture was declaredly only in an experimental stage, was focussed on the points that the process described was for butadiene—not isoprene-rubber, that only insignificant quantities had been made and vulcanisation experiments carried out, that no information given justified the estimate of 1/ per lb. as the probable cost of production, and that in any case no synthetic rubber could be expected on the market for some years to come.

True though all this may be it must not be supposed that the matter is disposed of even if the English group does fail to obtain the requisite funds. It is evident from the numerous patents being taken out that great activity on the subject prevails in the German laboratories, and that the main efforts of the Bayer & Co.,—with its 300 trained chemists—and of the Badische Fabrik, of indigo fame, are directed to the overcoming of the difficulties that at present stand in the way of rubber manufacture.

Professor H. E. Armstrong, writing in the *Times* of July 17, emphasises this, and deprecates the excessive jubilation of the English chemists. He points out that it is doubtful whether the fermentation processes can be adequately protected by patents, that probably agents other than sodium will be found to effect the polymerisation of isoprene, and that in fact there is reason to believe that the German firms even now have at their disposal information that renders them independent of the Perkin group. When they obtain a satisfactory process it will be a small matter, considering the enormous fund of technical experience they possess and the capital at their command—the Badische Fabrik laid down one million sterling in the developing of the indigo synthesis—to organise a manufacturing industry on a huge scale.

An eminently same article is concluded . . . . . . "It is of the utmost importance that the production of natural rubber should be made a scientific industry. In the case of indigo the margin in favour of the artificially made material is not so very great ; had the planters taken time by the forelock it is not improbable that they would have held their own. It will be well if rubber planters take the lesson of indigo to heart and learn without delay to set and keep their house in perfect order."

Nothing sounder than this can be said on the subject. Synthetic rubber's most vulnerable point will undoubtedly be in its mechanical properties after vulcanisation. It will be to high class natural rubber as is shoddy to silk,—but it will be necessary to be able to demonstrate clearly and decidedly from the beginning that it *is* shoddy.

Present methods of valuation will not suffice, methods by which rubbers differing widely in their practical qualities fetch the same price, by which "crepe" for instance sells for more than the certainly superior "smoked sheet." As long as "prettiness" continues to be the chief criterion there is little reason why synthetic should not enter the market on equal terms with natural rubber.

Buying then must be made on the basis of the mechanical tests afforded after vulcanisation—reliable means of valuing raw rubber having as yet been devised—and, as trade conditions prevent the buyer from undertaking these, they must be furnished by the seller. Either actual figures could be given with the consignment or a guarantee that it complies with standard tests.

This would constitute one step—a momentous one—in the scientific organisation of the industry advocated by Professor Armstrong.

But there are others—no less important. As yet the number of scientific workers engaged on the many problems that require attention can be counted almost on the fingers of one hand. Worse still, none knows what his fellow-workers are doing. At any time it may happen that two or more are carrying out independently the same work, halving at least the potential capacity for progress.

Surely this is a lamentable waste, the labourers being so few. The production of a uniform product of the highest attainable quality, is the ideal to be aimed at, and this can only be reached by patient and laborious experiment and by adopting the principle that knowledge gained and progress made must be thrown into the common stock.

Laudable as may be the ambition of each of the hundreds of estates, to make a name for its own particular brand, the futility of the endeavour must be obvious. Which buyer would care to know what *seringueiro* made the Pará he is purchasing?; and what estate gets a farthing more for its rubber because its neighbour is less successful.

Certain it is that were first plantation rubber of one quality, and that the best, there would not be the difference that prevails to-day between its price and that of "fine hard Pará" (equivalent to about 9*d* per lb.) To those who assert that "plantation" will always be able to undersell "synthetic" let us admit the fact, but point out that a decrease of 1*d*. per ib. in selling price means, or soon will mean, a loss of £300,000 a year to the industry, and that to have to resort to underselling would involve the throwing away of millions.

It is of the utmost importance therefore that the advent of "synthetic" on the market should be prevented if possible, from bringing about *any* fall in price.

From this point of view then it is of urgent necessity that a policy of taking no risks be adopted, and that the scientific organisation of the industry be developed as well as is humanly possible.—M. Barrowcliff in *the Agricultural Bulletin of the Federated Malay States.*

RUBBER ESTATES.

A correspondent of the "Financial Times" writing about the cost of rubber production calmly urges the necessity for revising the salaries of estate managers. This bold man would not, I presume, reduce the pay of really capable men. He says: 'All will admit that the European who accepts the risks and inconveninces of life in the tropics is deserving of adequate remuneration, but this does not justify the high salaries which are being paid on many estates. In the majority of these cases some justification could be found for these if really efficient and painstaking work were given in return. But what do we find? Many of the so-called managers and superintendents are callow civil servants and other officials, with but two or three years' experience of the tropics and none whatever of rubber cultivation. The inevitable result is that the most egregious blunders are constansly being made which will cost plantation companies thousands of pounds to rectify.

The Planters' Chronicle.

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Coffea Rebusta.

A correspondent writing to the *Revue Agricole*, the organ of the Chamber of Commerce of New Caledonia, recommends that, where the ravages of *Hemileia* and other diseases of coffee are severe, the plantations be replanted with *Coffea robusta*. Among the advantages claimed, according to an exhaustive study of it by M. Kramer, Director of Agriculture at Bintenzorg (Java), are: 1. The Robusta yields a first crop at two years of age; in the third year, the yield is 15¾ oz. per plant; and from the fifth year onwards, over 2 4/5 lbs. per tree. 2. The harvest continues in Java throughout the year, as the berries do not all ripen at the same time but during consecutive months and this is found to be a great advantage in the more economical utilisation of the labour force. 3. About 13 lbs. of cherry yield 2 1/5 lb. of beans. 43 more than all these, it is disease-resistant; although it cannot be said to be absolutely immune to diseases, it resists them successfully; the leaves do not fall off and the tree continues to flourish and fruit. 5. It is a good plan to treat the nursery plants with sulphate of copper or flower of sulphur.—*The South of India Observer.*

Indian Labour in Ceylon.

From the figures furnished in "The census of Ceylon, 1911, Estate statistics" by Mr. E. B, Denham, Superintendent of Census Operations, Ceylon, I note that among the total estate population in the island in 1911 of 278,558 males and 234,909 females, fully 234,594 males and 205,708 females are Indian Tamils, the greatest majority of whom are undoubtedly drawn from South India. Thanks to the comparative cheap and abundant labour still available to us in our province, our planters are not so hard put to in regard to the supply of coolie labour as are their compatriots in North India and especially Assam. But surely the whirligig of time must change the conditon of things and then perhaps my friends will look aghast! At any rate, it is my firm conviction that their present rather lukewarm and half-undecided attitude will one day—not, I fancy, very far distant—land them in deep waters. Action is certainly imperative—something short, sharp and decisive, to check this huge annual exodus of our labouring population to Ceylon, Federated Malay States, and a host of other lands to which we are not related by birth of kin or any other mode of rhyme or reason. To sceptics, I would repeat Mr. Asquith's historic "Wait and see;"—*The South of India Observer.*

in time after the entire geographical distribution of the industrial centres of the world; for in that case the nut plantation of the future will bear the same relation to the factory that the coal-mine does now." We have always maintained that the twentieth century will be the century for the tropics. This being so we may see the tropics during the next hundred years producing and utilizing its own supplies of fuel in the shape of ground-nuts, or other vegetable oil, according to which works out cheapest in the various localities.

" In France engines of the Diesel type have, we are told, been worked with pea-nut oil from the north of Africa. In Russia castor oil is used. Russia as a producer of mineral oil is particularly worthy of note, for castor oil does not appeal to us as being in any way as advantageous as pea-nut oil, being somewhat sticky if nothing else, and yet if Russia uses castor oil, we can reasonably take it that the owners of the engines find that the value of the unit of heat in this vegetable oil can be produced at a lower price than it can with mineral oil. If this is so in Russia, which has the mineral oil, but not the castor-oil plant on the spot, how much cheaper and better should it be with the tropics where they can get ground-nuts and a host of other oil-yielding nuts on the spot, but where mineral oil as a rule has to be brought from America or Russia. " As the underground resources of mineral oil and coal," points out the Journal of the Jamaica Agricultural Society, " become more and more depleted, the conditions in favour of vegetable fuel become more and more favourable."

" This is very true, but may be the tropis, if no other centres, will not wait until the coal and mineral oil supplies are depleted, and why should they ? If they, up in the backwoods, or away from the seaports, can use engines of the Diesel type with nut-oil for fuel, the unit of heat value of which is sufficiently cheap to enable them to turn out produce on the spot, whether raw material of manufactured goods, there is no need to wait ; the forests can be cleared and transport provided, factories erected, and local industries started, as the Brazilian Government, among others, are trying to start, because there, right in the heart of the tropics, they can raise their fuel supplies, *viz.*, acres and acres of nuts planted to supply the oil, augmented possibly by other vegetable oils from indigenous trees whose nuts can be collected in the virgin forests around. What this would mean to Brazil and South America generally is inconceivable to-day.

" America, like ourselves, is also alive to the possibilities of engines able to utilise nut-oil as fuel. " Coal then in its crude shape is doomed," said Stead (of the *Review of Reviews*) just before his death, and our contemporary, *Current Literature*, of New York agrees. " Nut-oil to replace coal," they say, " this means no wagons, no stokers, no smoke." The Diesel oil engine, we are told, is an engine which driven is by oil. Not oil fed into a furnace to generate steam, " but oil used direct—and in the earth-nut (*i.e.*, gtound-nut) *Arachis hypogoea*, you have an inexhaustible supply of force drawn year by year from the soil which will never fail you."

" Those therefore who are running estates, tea, coffee, sugar, Cacao, cocoanut, or what not, must keep their eye on what is being said and printed concerning these internal combustion engines, and the possiblity of using vegetable-oil for their fuel."—*Tropical Life.*

THE CEYLON ADMINISTRATION REPORTS.

The Ceylon Administration Reports for 1910-11 have just been received and constitute a bulky volume full of interesting information. An endeavour will be made in these articles to extract some of the items of more special interest to planters in Southern India.

The Vital Statistics are dealt with by the Registrar-General. The population of Ceylon as enumerated at the Census of 10th March 1911 was 4,105,535 which is an increase of 15·1 per cent. since the last Census in 1901. The following table of Indian Immigrants is given, showing the arrivals and departures of Indian Coolies over a series of years. This is most interesting just now as bearing on the labour question :—

Year.	Arrivals.	Departures.	Excess or Deficit.
1900	207,994	112,936	95,058
1901	129,603	118,343	2,260
1902	87,763	63,917	23,846
1903	77 966	47,715	30,251
1904	77,302	56,246	21,056
1905	160,080	65,513	94,567
1906	88,945	59,659	29,286
1907	55,724	63,671	7,947
1908	86,401	78,740	7,661
1909	79,845	61,287	18,558
1910	118,613	64,660	53,953
Yearly-Average—			
1871-1880	102,511	82,471	20,040
1881-1890	57,856	52,752	5,105
1891-1900	121,484	85,057	36,427
1901-1910	95,324	67,975	27,349

The Author points out that after 1907 the experience necessitated the appointment of a Labour Commission on whose recommendation the Ordinance No. 9 of 1909 was passed. Simultaneously there occurred an improvement in the labour conditions till, in 1910, the arrivals rose to 118,613 and the excess of arrivals over departures was 53,953.

At the Census of 1911 there were 7,625 Europeans in Ceylon, and 1,059,354 Tamils out of the total population. The birth-rate in 1910 was at a rate of 39 per thousand, and the death rate 27·3 per thousand as against 31 per thousand in 1909 showing that the public health was better. The number of deaths due to all causes on estates, (by which is meant more than ten acres of cultivation) was 15,642, of which nearly half were due to specific, febrile and the zymotic diseases.

The Director of the Royal Botanic Gardens says in his report, "the number of complaints and inquiries regarding the fungus diseases of tea, rubber, and cacao has probably been below the average, partly owing to the exceptionally dry weather which marked the first five months of 1911. Most of the diseases sent in have been readily recognizable with the help of the excellent series of Circulars published by Mr. Petch, and no new disease of a serious nature has been reported." Attention has frequently been called to the nodules on rubber trees during the dry weather, and the view is expressed by the Mycologist that these nodules are not associated with any particular fungus, and their occurrence is ascribed in a large number of cases to the use of pricking tools of the rotating or spur pattern. The Director adds, "in my own experience the appearance of these nodules is certainly most frequent on pricked trees, but I am informed that they are not in-frequent on trees which have never been pricked. In the latter case, over tapping, a high elevation, and dry weather seem to be definite factors in their production; anything in fact which tends to reduce the vitality of the tree."

Dealing with the discolouration of biscuits, the author says, "It is perhaps only a coincidence that an increased number of complaints regarding the appearance of different kinds of spots during the preparation of rubber have synchronised with a period of exceptional drought." The majority of cases are undoubtedly to be attributed to the action of bacterla, and in these cases the remedy is to b e sought in the disinfection of the curing house of the utensils used in the preparation of the rubber. The simplest and most effective disinfecting ageuts are sunshine and boiling water. Care must also be taken that the water supply is not contaminated. It appears, however, that other kinds of spotting appear which cannot be accounted for by the action of bacteria. Some of these require further investigation."

Ceylon like most agricultural countries has an Ordinance in operation for the prevention of importation of pests and diseases from outside sources, and also one for the compulsory treatment of local pests. In November last a new rule came into force by which Tea Seed was added to the list of guaranteed articles, and all Tea Seed imported is now treated at the Government fumigatorium.

In the Report of the Inspector of Factories it is stated that there are 863 Tea factories and 11 Rubber factories in Ceylon, and the annual outturn of tea is from 100,000 to 150,000 lbs., the number of persons employed daily in the Tea factories being 15 to 25.

R. D. A.

"Rex" writes from London on 27th September, 1912:—

"Mr. M. de P. Webb's article on India Office finance in your issue of 5th September, serves a useful purpose in questioning the necessity of upholding such large cash balances by the India Office, and why such balances should go on increasing every year. Some reason should certainly be given by the Secretary of State to explain this apparently wateful item of finance, and the Indian Chambers of Commerce would be justified in asking for an explanation from the Government of India. These balances are probably at their largest about 31st March, when the statement of accounts is issued. The average balance of the year is probably much below the balance then shown. But allowing for that, the annual increase in these accumulations, of what must be termed idle money, and seems to me to justify Mr. Webb's reference to them as the proceeds of unduly heavy taxation. Also it must be admitted that these balances are extremely useful to London Banks and financiers. It is a perfectly right and fair question to ask if, in the first place, these balances are the result of over-taxation, and secondly, if the taxation being necessary the money is being used to the best advantage of India.'—*Capital.*

Since the beginning of July a constable of the Indian police has been placed on duty in Colombo harbour. I am told that he has been put there to detect absconders from India arriving at this port. Whether he will really be able to detect them is, of course, another matter.—*Commerce.*

RUBBER.

The German Press and Synthetic Rubber.

The Synthetic rubber discoveries have provoked a lively and acrimonious discussion in the German Press. The "Deutsches Kolonialblatt," commencing on the artificial fish rubber states that the process is neither of value nor is it new, having been tested some years ago by the "Centrale fur Kantschuk" and found quite devoid of industrial interest. In the process the albumen is separated from the fish bodies. The product is afterwards fermented with formaldehyde. The resultant substance therefore represents nothing more than a kind of gelatine composed of fish manure and formalin afterwards treated with sulphur. Extensive tests have proved the inability of this material to resist the action of water. Hence the substance is valuless even as a substitute.—*Greniers Rubber News.*

Use of Atmospheric Nitrogen.

DR. EYDE SHOWS EFFECT ON EXPLOSIVES INDUSTRY.

Dr. Samuel Eyde, of Christiania, Norway, delivered a lecture on Saturday before the International Chemical Congress at the Museum of Natural History on the "Utilization of Atmospheric Nitrogen for the Manufacture of Fertilizers and Products in the Explosive Trade." The lecture was illustrated with photographs and charts showing the wonderful development of this industry in Norway during the past eight years, having now reached a utilization of 200,000 horse power, with a total production of 120,000 tons per annum. The products of the company have already been introduced into the United States, and considerable success has been attained in nitrate of ammonia and nitrate of soda, and a great market is expected here in nitrate of lime and concentrated nitric acid. The methods of manufacture are constantly being improved upon and new products will be manufactured from time to time. The purity of the products manufactured, especially nitrate of ammonia, will, according to the experience of the British navy, have a vast bearing upon the life of the heavy guns, as this purity reduces the heat of the discharge. The factories employ comparatively few workmen. Hence the materials can be most economically manufactured.—*New York Journal of Commerce.*

Potash Deposits in Nevada.

BEDS FOUND NEAR GOLDFIELD WILL BE THOROUGHLY MINED.

Goldfield, Nov., Sept. 24th.—Potash deposits recently found near Goldfield are believed to be of enormous value. There are substantial indications of the presence of commercial potash at a number of points in Southern Nevada, and recent tests of material taken from the eastern border of the Silver Peak salt marsh or dry lake, less than 20 miles west of Goldfield, have yielded results that point to this as the most important discovery yet made in the State and the one most likely to produce potash of a high degree of purity. A number of Goldfield people have filed on placer locations in the district and the ground is to be prospected and tested in a thorough and exhaustive manner.

For more than a year past the Soils Bureau of the United States Geological Survey has been conducting a systematic search for commercial potash and a similar quest has enlisted the efforts of many individuals and corporations, including the Standard Oil Company and the "Borax" Smith interests. The discovery of potash in quantity would tend to break the world monopoly of this product now held by Germany and put an end to the payment by the United States to Germany of many millions of dollars.—*New York Journal Commerce.*

The Direct and Indirect values of Scientific work.

The great improvement which has taken place in recent years in the application of scientific knowledge to the practical affairs of agriculture has exercised a most beneficial influence over the results obtained from the cultivation of crops and the rearing of stock. If the agricultural progress of the world during the past twenty-five years were to be carefully scanned, many instances would be found illustrating the value of the work of scientists when the results of such work were properly applied to the solution of existing problems. All branches of science would yield instances illustrating this point; but for the present purpose, a brief consideration of a few entomological problems will suffice.

From the instances given below it will be seen that the study of such problems often leads to the discovery of facts which have an importance greater than that of the original investigation, and extend much beyond the limits suggested by the problem under consideration.

The study of cattle ticks and Texas fever resulted in a knowledge of the dissemination of several diseases by insects and ticks; the attempts to control the San Jose scale brought about the production of a number of contact insecticides of greater efficiency than those previously known; the struggle against the gypsy moth caused the commereial production of arsenate of lead, and gave a stimulus formerly unknown to the attempts to import and establish natural enemies for the control of an introduced pest; while the steady warfare waged against the cotton boll weevil has produced favourable changes in agricultural practice, in the infested districts, in the matter of cultural methods, rotation and diversification of crops.

The study of ticks in relation to fever in cattle has brought about an accumulation of knowledge of the most useful and varied kinds. In the first place, a study of the life-history of ticks, and of the disease known as Texas fever or tick fever. demonstrated the fact that the micro-organism causing the disease is transmitted to healthy animals by the bite of the tick, and it was further found that no other means of infection could be proved than the bite of ticks which had previously fed upon infested animals. This led to studies of ticks and bitting insects which resulted in giving a knowledge of the manner of transmission of malaria, yellow fever, sleeping sickness and filaria—among the diseases of the human subject—and of the several tick—and insect—borne dissases of domestic animals. This knowledge has had the effect of causing all biting and blood-sucking arthropods to be regarded with grave suspicion as to the part that they may play in the dissemination of disease.

Further study of the tick led to a knowledge of its life-history and habits, from which it appeared that the fully-gorged female ticks drop from the cattle in order to deposit their eggs on the ground, and that the young hatching from the eggs can live for only a certain time without food. This led to the adoption of a pasture rotation system, which consists of the practice of enclosing cattle on a certain area during the time when the adult ticks are dropping, and removing them to another, tick-free area before the young are hatched; cattle are prevented from entering the pasture where the eggs are deposited, until the young should all have died for want of food. This, in general, is the practice by means of which large grazing areas have been rendered tick-free in certain of the Southern States, and in consequence fever-free. In this manner more than 100,000 square miles of territory formerly included in the tick-infested area is now declared tick-free, and the cattle industry of that region is thus relieved from a tax, imposed by parasites and disease, which was formerly very severe.

The benefit derived from the employment of insecticides in combating insect pests is incalculable. In many parts of the world certain crops are subject to attack by insects of different sorts, and in order that profitable returns may be obtained, it is necessary that the effects of insecticides of various kinds should be understood and the life-history of the insects known. The proper insecticide can be used so as to produce the greatest killing effect on the insect and the least injurious effect on the crop plant.

Not many years have elapsed since the use of insecticides was but little understood, and when there were but few well-known substances available for the purpose. At the present time there are several arsenical and other stomach poisons, prussic acid from potassium and sodium cyanides as a fumigant, and a great variety of contact spray materials including such substances as kerosine and other oils, soap, rosin, salt, sulphur and lime, the use of which is understood by planters and farmers in those localities where it is necessary.

The San Jose scale has been a serious pest on apple and other orchard crops in nearly all parts of the Temperate Zone, and it is due largely to the resistance of this insect to the ordinary spray washes that so much improvement in contact insecticides has been made in the past few years.

The gypsy moth is a European insect which during the past twenty-five years has been a most serious pest to orchards and woodland in the Eastern United States. When the attempt was made to control this pest by means of Paris green and London purple it was found that these insecticides were not efficient, for the foliage of the trees was injured by the poison even when used at strengths which were insufficient to kill the caterpillars of the moth. To meet the need for a more satisfactory poison, lead arsenate was prepared. This compound can be used in mixtures with water at strengths sufficient to kill any leaf-eating insect without injury to the foliage, and is thus one of the most useful arsenical insecticides for spraying plants, if not the most useful insecticide among these.

Another result of great value that has come about from the study of the gypsy moth problem is the stimulus that has been given to the interest in control by natural enemies ; this method of control had been used previously, notably in Hawaii, California, and Australia but probably nowhere on the same large scale. Parasitic and predatory insects from Europe and Asia, where the gypsy moth occurs, are transported in enormous quantities to Eastern Massachusetts, where they are carefully reared in the insectary, and colonized in the open. This work is still in an experimental stage, although it is being carried out on a large scale involving the expenditure of enormous sums of money.

The Mexican cotton boll weevil is one of the most serious pests of an agricultural crop known. Less than twenty years have elapsed since this insect spread from Mexico into the cotton fields of Southern Texas. During this period it has progressed steadily north and eastward, until it now occupies a large part of the cotton belt. No insecticides or remedial measures have sufficed to stop its progress; native parasites do not seriously reduce its numbers, and wherever it becomes established it greatly reduces the yield of cotton. As a result of careful study and investigation over a long series of years, it has been found that early planting of early maturing varieties greatly reduces the liability of serious attack; while cultural methods such as wide planting, which allows the sun to penetrate to the ground between and under the plants, the early destruction of all cotton plants as soon as the crop is harvested, and also the complete removal and destruction by burning of all weeds, rubbish and cornstalks which would furnish hiding places in which the boll weevils might hibernate, still further reduce the severity of the attacks. In addition, a system of rotation has been devised which is in use in many places, and this often results in a diversification of crops which is most beneficial. By these means the Southern farmers are able to grow profitable crops of cotton in spite of a most serious pest, and they will ultimately gain an advantage as a result of the changes in method, that they are being forced to adopt, which will probably be greater than the losses which they at first experienced.

All these examples are of the greatest interest on account of their direct value. Some of them are useful, further, in that they serve to afford instances where, although the degree of success first anticipated has not been attained, the bold continuation of the work has proved to be of incomparable benefit and has often brought about salutary changes in methods which, probably, could not have been caused to accrue in any other way.—*Agricultural News.*

Useful Information Concerning Camphor.

The Department of Agriculture of the Federated Malay States has issued recently Bulletin No. 15, which deals with the cultivation and preparation of camphor in the Federated Malay States. The following information, or more immediate interest in the West Indies, is abstracted from parts of this bulletin.

Varieties of Camphor.—In the East, two distinct kinds of camphor are known, that from the tree called *Cinnanomum Camphora* known as Chinese, Japanese, or Formosan camphor, and the product known as Borneo camphor, that is obtained from the plant *Dryobalanops aromatica*, which grows in Borneo, Sumatra and Malaya. The two products are distinct chemical compounds, but it is possible to prepare ordinary camphor from Borneo camphor. A third camphor is known, called Nagai camphor, which is yielded by *Blumea Balsamifera*, a plant growing in Burma.

Supply and uses of Camphor.—The exports of camphor from Japan in 1905, 1906 and 1907 were 1,350 tons value £261,756; 1,570 tons value £370,545; and 1,805 tons value £512,730; from China in 1905 and 1906, they were 320 tons value £59,840 and 882 tons value £222,264. Most of the Japanese camphor comes from Formosa: information concerning the production in this island was given on page 9 of the present volume of the *Agricultural News.*

About 70 per cent. of all the camphor obtained is used in the manufacture of celluloid, or xylonite: most of these remained is employed for medicinal, pharmaceutical and sanitary purposes. An idea is prevalent that camphor is used largely in the manufacture of smokeless powders and explosives; only a small amount is at present actually employed in this way.

Synthesis of Camphor.—As is well known, synthetic camphor has been produced on a commercial scale, but it cannot compete successfully with natural camphor for any length of time. It is made from oil of turpentine, and its preparation in the countries where it used to be made—England and Germany—has probably ceased because of the fall in price of natural camphor since 1907. Its existence is useful, however, because it prevents any extensive inflation of the prices of the natural product.

Distillation of Camphor in Japan.—The camphor is steam-distilled and the vapour condensed in a box, divided into compartments and placed upside down, in water, in a larger, shallower box. The sides of the inverted box extend above the bottom, and water is constantly allowed to run on to this box, keeping it cool and renewing the layer of water in the larger, shallower box which acts as a seal. A third box is inverted over the first, and is made in a similar way to condense any vapour that may escape; in both cases holes are made in opposite corners of the partitions in the boxes in order to cause the vapours to travel by a circuitous route. The crude camphor and oil are skimmed from the surface of the water or scraped from the sides of the condenser; separation of the two products is effected as far as possible by pressure.

Cultivation of Camphor.—A method of cultivation recommended by the United States Agricultural Department was described on page 5 of this volume of the *Agricultnral News.* In Malaya, before planting takes place, the seeds are soaked in lukewarm water for twenty-four hours, and the resulting seedlings transplanted when about a foot high, the tops being first cut off and the roots pruned. The transplanting is done during the wet season, and careful weeding is necessary. Well-prepared nursery beds are employed, and sand is added to the soil so that it may be sufficiently porous not to allow the seeds to rot during their long period of germination. So far, this method of propagation, as well as that from root cuttings, has not proved successful in Malaya, and it is considered at present that the best way to obtain a stock of plants is to import two-year-old seedlings from Japan, provided that the price of these is reasonable. Success has been obtained by using this method.

Experiments in Distilling Camphor.—In initial experiments in Malaya, with material from Batu Tiga, Selangor, 26 lbs. of prunings, consisting of leaves 64·9 per cent. and small stems 35·1 per cent. was used. This gave, as the result of different distillations, 0·19 lb. of distillate, the yield on the original material being 1·06 per cent.; the proportion of oil in the distillate was very small.

Subsequently, experiments were carried out on a commercial scale; a useful, detailed description of the apparatus employed is given in the bulletin. Separate distillatlons gave the following results:—

Weight of material.	Percentage of whole plant.	Yield of camphor and oil in oz.	Yield per cent.
12·5 lb.	...Leaves 7·5 ...	2·00 ...	1·00
30·0 ,,	...Stems (under ½ inch diameter) 18·2. ...	1·07 ...	0·22
93·0 ,,	...Woody stems (over ½ inch dlameter) 56·3...	9·08 ...	0·61
29·5 ,,	...Roots 18·0 ...	5·07 ...	1·10

The distillate from all parts except the roots consisted chiefly of solid camphor with very little oil. That from the roots was comprised entirely of an oil apparently quite distinct from that given by the other portion, and possessing what is decribed as a lemon-camphor odour. The results of the experiments are thus summarized in the bulletin:—

(1.) A yield of about 1 per cent. of camphor and oil (consisting chiefly to camphor) may be obtained from prunings from five-years-old plants and probably from younger plants.

(2.) The distillation period should not exceed three hours in the case of prunings, that is leaves and young branches.

(3.) A much larger proportion of camphor is obtained from the leaves than from the branches, and the yield from small twigs is greater than that from older branches in trees of this age.

(4.) Air-drying of the leaves has not detrimental effect on the yield, but loss would probably result if the leaves were exposed to direct tropical sunlight.

Further experiments were conducted during 1911-12, using a new condenser, the old one, which was Liebig condenser with four tubes round which cold water circulated, having proved unsatisfactory, for reasons that are given. The new condenser was made of teak; it was replaced later by a metal condenser constructed of galvanized iron having the following dimensions: length 3 ft. 10 ins., breadth 2 ft. 4 ins., depth 1 foot 7 ins., extension of sides over bottom 4 ins., length of exit pipe 6½ ins., diameter of exit pipe 2 inches. This was placed in the shallow box used for the teak condenser, which was 4 feet long, 2 feet 6 inches broad and 1 foot 1 inch deep the depth of water in it being 6 inches. This condenser was found to give excellent and constant results. the yields being considerably increased. Further, the camphor was 'of a beautiful white colour' and the camphor oil was pale yellow. No corrosion took place during three months' use, and the joints, which were soldered, showed no signs of leakage. The matters thus described are of importance, as they show the way in which one of the chief difficulties connected with the distillation process, namely that of condensation, was solved.

In the trials with the metal condenser, 5,338 lb. of prunings were used; these gave, as a result of several distillations, a total yield of camphor and oils weighing 34·96 lb., or 0·66 per cent. on the weight of the original material.

Several other matters of importance are included in the Bulletin, which is usefully illustrated to show the construction of the apparatus employed for distillation on a commercial scale.—*Agricultural News.*

The Raw Material Position of Rubber.

The rubber statistics published by Messrs. S. Figgis and Co., on the 1st of September support the bullish views as to the future of the raw material. The visible supplies, and the price of Hard Para on the same date for the last four years are given as follows·

	1909.	1910.	1911	1912.
Vtsible supply	3,063	4,248	7,265	4,135
Price of Hard Para	7s. 11d.	8s.	4s. 8d.	5s. 1d.

The receipts at Para including Caucho show an increase of 310 tons over 1911. The landings and deliveries in England and America from the 30th June to the 31st August are highly satisfactory as showing that the demand keeps well up with the supply. The figures are—

	England. Tons.	America. Tons.
Landing	2,176	2,480
Deliveries	2,219	2,470

Continental stocks show a decrease, the imports being 765 tons against deliveries 800 tons. The interests of the consumers and producers are of course to a certain extent antagonistic. Those desiring cheaper supplies of the commodity naturally affect to believe that the increasing outputs must be largely in excess of the demand, When confronted with the great increase in the motor traffic the constant accession of motor buses in the streets, of motor cars all over the country for excursion and coaching purposes, and the rapidly expanding demand for motor lorries, it is pointed out that economising influences are at work, that less material is being used, and the wear and tear considerably reduced. Nearly all Mincing Lane men are agreed that a shortage of rubber is again in sight. The Mincing Lane view is of course derived from a broader outlook than that of the manufacturer who simply speaks from the point of view of his limited personal experience. The action of the United States Rubber Trust in planting up as quickly as possible large areas with rubber quite regardless of cost is strong presumptive evidence that the world's biggest rubber consumer looks upon rubber as likely to prove highly remunerative. At the General Meeting of another large consumer of rubber, the Dunlop Company, the Chairman Mr. Arthur du Cros, made some interesting remarks, which we reproduce below:—

I wlil deal with the question of the rubber estates now. The idea of investing in rubber estates, and becoming our own growers of rubber, is not a new one. We always believed in that necessity. It was of vital importance to a company buying so iargely of this produce in the open market, in these days to obtain it on better terms than the terms offered in the market, and for the last ten years we have been endeavouring to get into that position, apart, of course, from the other considerations that the business is a profitable one entirely on its own merits, and that it secures to us a certain amount of independence in regard to the market fluctuations of rubber. In 1900 we began by sending expeditions to the Amazon Valley, Central America, Mexico, and the West Coast of Africa, and we investigated the conditions of rubber producing at that time very closely indeed; but we found that they were too speculative and too uncertain for us to advise our shareholders to invest their money in. At a later stage we examined the possibilities of cultivating rubber in the Middle East—in Ceylon and the Federated Malay States, and generally in the Middle East. We found that to be a perfectly practicable proposition. It was not complicated by the operations of any "ring;" it was a clean business, and easily understood. Then, gentlemen, as the result of our investigations, we acquired the first of rubber estates in 1909. I do not say that we commenced to plant in 1909; we purchased estates which were to some ektent matured. and, as a matter of fact, some of the rubber owned by the company is to-day between six and seven years old.

We have continued these operations untill to-day we are in a position to state that there are hardly half a dozen larger planting companies in this country than ourselves. We own nine different estates comprising over 17,000 acres. Of that area over 6,660 acres are now planted. and at the end of this year we shall probably have nearly 7,500 acres planted. We do not propose to rest there. Our programme next year will probably be a very extensive one, and we shall bring up that acreage to nearly 9,500 acres, still leaving over 8,000 acres of undeveloped rubber land the property of this company. All our estates are situated in the Middle East, which is the most favourable part of the world for growing rubber. We are obtaining rubber to-day from seven of those nine estates, and as those of you who are acquainted with rubber planting properties know, as time goes on rubber matures speedily, and in our case large blocks of rubber are now rapidly approaching the bearing stage. We have been obtaining rubber from, I think, seven of our estates during the whole of this year. We are erecting four factories upon these four groups of estate for the purpose of dealing with their rubber and we find that we can improve upon the method of manufacture of the raw material which we find in vogue in the Middle East, because our ex perience as rubber manufacturers shows us what is necessary, and we think that the quality of the rubber produced can be improved. Now, generally, I want to say that we consider, having given this matter the most exhaustive attention, and having considered it most carefully and at great length, that our estates are well situated.

The future prospects of rubber planting I consider are very good, but at the same time they are more problematical in the case of planters, and those who only deal with planting, than they are in the case of manufacturers who both grow and manufacture. I have told you that the Dunlop Rubber Company at the end of this year will have 7,500 acres of rubber, and those estates are taken at cost in our balance-sheet, and in the figures of our estates to-day I have taken them at cost, and have made no ap-appreciation, although some of them have been in our possession since 1909. The Dunlop shareholders so far have not had an opportunity of putting a value upon this development of our business, because it has not been possible for us before now to tell them exactly what we have done. I think that a company like ours, engaged in the complete industry, if I may put it that way both the beginning and the end of it, the production of the raw material and then the treatment of that raw material—is in a very strong position, and I think, that any company in that state has a very assured position.

These opinions are worth noting as showing that the leading manufacturers in England and the United States are convinced that the rubber industry has come to stay and is likely to prove highly profitable for many years to come. Faith in the rubber industry is gradually spreading among big interests, and when the feeling broadens out among the whole ot the mercantile community we shall see rubber shares stand on very different investment level from that ruling to-day.—*Greniers Rubber News.*

DISEASES OF RUBBER.

Mr. T. Petch, the Government Mycologist, spent a useful day in Kalutara yesterday, and what the planter of that district does not know about canker now is not worth knowing, or at least is not known by anybody else. Canker in Ceylon has proved less serions than was at first anticipated, but it is still a disease that requires to be treated with a great amount of respect, and the remarks of Mr. Petch, which we give in full elsewhere, will repay study by every rubber planter in the Island. It will be noticed that Mr. Petch gives the tried methods of treatment of the diseases and only recommends spraying, as a means of prevention, tentatively until it is found out whether it prejudicially affects the quality of the rubber. Ceylon has in its comparative freedom of disease a great advantage over Malaya, where the white ant is so troublesome, and it is to be hoped that this advantage will not be lost, or at least not by a deterioration on the part of this country.—*The Weekly Times of Ceylon.*

The Planters' Chronicle.

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(INCORPORATED.)

Scientific Officer's Papers.

CXI.—STUDIES OF LEGUMINOUS GREEN DRESSING PLANTS.

I. SESBANIAS.—(*Continued.*)

In Scientific Officer's Paper, No. 107, (*P. C.*, Vol. VI, p. 484) the *Sesbanias* as green dressings were dealt with to some extent. Since that paper was written a sample of *Sesbania aculeata* has been forwarded to me for analysis by the Scientific Assistant for Myssre. This came from a plot of this plant which is being grown as a green dressing on Baithney Estate near Saklaspur in South Mysore. It is a shallow rooting plant in this situation forming dense masses of spreading roots covered with nodules.

The following analysis was made of tne whole plant, including roots, stems, and leaves. The leaves themselves contain 3·74% of Nitrogen in the dry matter:—

		Whole Plant; Roots, Stems and Leaves.	
		As received.	Calculated to dry matter.
Moisture ...		27·34	—
*Organic Matter		60·38	83·11
Ash	Silica	—	0·59
	Phosphoric Acid	—	1·13
	Potash	12·28	4·15
	Lime	—	1·61
	Other Mineral Matter (by difference)	—	9·41
		100·00	100·00
*Containing Nitrogen ...		—	2·65

	Ash Analysis.
Silica	3·51
Phosphoric Acid	6·66
Potash	24·59
Lime	9·54
Other Mineral Matter (by difference) ...	55·70
	100·00

It will be seen that this analysis differs considerably from the one quoted from Ceylon in Sc. O. Paper No. 107. This is probably due to the fact that the Ceylon analysis was made on stems and leaves only, though there is nothing in the original to show exactly what the material analysed was. The leaves of the Ceylon grown plant contained 3·33% of Nitrogen, which is in close agreement with the Indian sample.

In a 'Note on Manures' published as Bulletin No. 23 of the Assam Department of Agriculture, the following account of *Sesbania aculeata* as a green dressing is given:—

Dhaincha. (*Sesbania aculeata*).—Is particularly useful as green manure in this Province, as it grows well on almost every kind of land. It makes good growth even if the lower parts of the plant's are submerged in water, though it cannot stand too much water in a very young stage. It produces a large amount of leaves and will grow up to 10 or 12 feet high. The stems, however, become very woody if left too long, and are not easy to incorporate with the soil afterwards, If allowed to stand too long and become woody, the stems do not easily decompose in the soil; in fact they more often persist throughout the ensuing season, opening up the soil to such an extent as to diminish the water content of the surface soil at a time when moisture is extremely valuable. Perhaps the most suitable stage to plough it into the soil is when it is 5 or 6 feet high, but no rule can be laid down as other considerations such as the crop which is to follow, and the character of the season largely determine when ploughing in shall be done. *Dhaincha* should be sown as early as possible after the first seasonable rains fall, and should be ploughed in by about the middle of July. On the Dacca Farm, *dhaincha* sown early in May grew luxuriantly, producing a 5 to 6 feet crop which was ploughed in early in July with excellent results, decomposing entirely in a short time.

" On the old alluvial soils of the Dacca District (and the same would no doubt apply to similar soil formations in other parts of the Province, some preliminary work done by me last year shows that a good crop of *dhaincha* adds much more organic matter and nitrogen to the soil than we can get from *sunn-hemp*."

RUDOLPH D. ANSTEAD,
Planting Expert.

DISTRICT PLANTERS' ASSOCIATIONS.

Anamalai Planters' Association.

Proceedings of a General Meeting of the Anamalai Planters' Association held at the Paralai Bungalow, on Monday, the 14th October, 1912.

PRESENT.—Messrs. G. A. Marsh (Chairman), G. L. Duncan, J. Harding Pascoe, E. W. Simcock, B. A. Marden, E. Fowke, G. Hayne, J. H. Ireland Jones, A. C. Cotton, H. N. D. Walsh, J. O. K. Walsh, H. W. deSalis, M. B. Pollard Urquhart, J. Hatton Robinson (Honorary Secretary).

1. The previous meeting's proceedings were confirmed.

2. *Report of Delegates to the U. P. A. S. I. Meeting.*—The following Report was read to the Meeting:—

Gentlemen,—As directed by you we attended the Nineteenth Annual General Meeting of the U. P. A. S. I. held at Bangalore as your representatives.

The Meeting was well attended, twelve District Associations being represented by 20 delegates.

You will have read both the Chairman's Address and the Secretary's Report in the press—the latter being a very brief summary of the year's work—as could only be expected, seeing that Mr. Norton took over the office from the late Secretary a few days previous to the Meeting and evidently experienced much trouble in getting hold of the necessary information to work out his report on.

The Chairman's Address as you will doubtless agree was very tactful. Mr. Abbott had had a year of great difficulty in getting the work of the Central Association carried out, and during that time he upheld the dignity of the Planters under often very trying circumstances.

The Proceedings have appeared in the *Daily Press*, so that you will have already read as much about the Meeting as we can tell you. Much important matter, however, was discussed in Committee, and this you will get when you receive the Book of Proceedings.

The chief items which are of interest are the following:—

Roads and Communications.—We supported the Coorg men in their resolution to again approach the Government towards opening up the Province of Coorg by means of Railway connection.

Mr. Hughes brought forward a very strong argument in supporting the Karachi Chamber of Commerce in their contention that the Cash Balances held in London on behalf of the Government of India, some £18,000,000, could be very much better employed in this country in building Railways and Communications, than being lent out at home at a very small interest, in fact, in certain cases, at no interest at all.

We seconded Mr. Hughes' resolution which was carried.

Weights and Measures.—All of us know how coolies coming from different districts grumble at the measure used in this district; we were, consequently, only too glad to support the resolution brought forward, "that the Central Association approaches the Governments of India (through the Government of Madras), Mysore, Travancore, and Cochin, that further steps be taken towards the general standardization of all weights and measures in India."

Finance.—Here we had a difficult problem to face. We had your instructions that we were loyally to support our still belonging to the parent Association—that your Association was not in agreement to pay a higher subscription—that if a higher subscription was necessary, it must be due to obligations due to the Scientific Department. On the other hand we had your instructions regarding labour matters to support any workable scheme leading towards the combination of the various districts.

As the Finance question had first to be settled we could not see how we were to promote your interests when the labour question came up—unless we joined in with the majority and paid more so as to swell the Association's funds. From the Finance Committee we learned that the Scientific Department had not increased in expenditure. Those Associations who could afford the luxury of Scientific Assistants were paying extra for them—the payments these Associations made merely went through the parent Association's books, but had nothing to do with the old Scientific Department which we have always supported.

We were informed that the parent Association, on the 2 anna basis, was collecting a larger income than ever before.

Subscribing as we did only Rs.310-12-8 for 7,459 acres, we could not feel ourselves in a position to demand labour reforms—unless we also fell in with the other Associations and paid what they did. We therefore agreed to come in on the 2 anna basis, which covers our subscription to the Scientific Department as well, on the understanding that the U. P. A. S. I. funds were put on a sound basis, and that some workable scheme for improving labour matters shall be brought forward in the near future.

Planters' Benevolent Fund.—It was resolved to ask the Mercantile Bank of India to take charge of the investments and funds, and that cheques drawn upon the fund require the signature of the Chairman for the year as well as the Secretary of the U. P. A. S. I.

Agricultural Matters. Fertilizers.—The Scientific Department were asked to try and see their way to periodically verify the guaranteed analyses of manures sold by different manure Firms. The Scientific Department in this matter alone will be of considerable help to us—and Mr. Anstead is to be heartily thanked for so promptly letting us know the results of some manures recently sent to him for analyses. These results will be made known to the members of the Association.

Labour.—This is a matter with us which puts in the shade all other problems connected with our planting. We have been agitating for years for labour reform, and in 1909 Mr. Brock put a scheme, drawn up by this Association, for dealing with labour difficulties, in front of the U. P. A. S. I. Since then many resolutions and suggestions have been made but very little has been done. You have read what Mr. Hamilton said at the Meeting about the Zanzibar Government importing coolies from Bombay to work on its plantations, and also what was mentioned by Mr. Hughes about what the Straits Government are doing to help the planters there.

The matter is more serious than we realise and should not be trifled with any longer. We have done nothing to check organised labour agencies from off our very estates. We have felt surprised and alarmed when it has occurred—but it can only be expected if we remain as we are now doing and take this sort of thing lying down. Your Association does not expect a perfected scheme to start with, but it does strongly advocate immediate action to check, even in a small way, the present unfair recruiting methods employed by outside agencies.

Knowing that you were prepared to go some lengths to support such a scheme, your delegates agreed on your behalf to subscribe to the U.P.A.S.I. on a two anna basis. We made it distinctly understood that we did so on the understanding that a workable labour scheme should be brought forward either at, or, before the next Annual General Meeting of the U.P.A.S.I. and proposed the following resolution which was carried:—

"That a Sub-Committee consisting of Messrs. Abbott, Brock, Hughes, Browne and Mahon with power to add to their number be selected to receive the opinions of the various planting Associations and to harmonise them if necessary and to circulate a working scheme to the District Associations before the next Annual General Meeting, with the idea of improving the labour position."

The task allotted to the Sub-Committee is a very difficult one, but we may feel certain that they will make a start. A scheme of Registration was also put before the Meeting. This has since been published and your opinion will have to be given regarding the same.

Election of Members.—We voted for the members elected. The election of Mr. Abbott, as Chairman, for the second year in succession, was most popular.

We also voted for the nomination of Mr. Barber as Planting Member of Council.

The Meeting approved of the Report, and a vote of thanks to the delegates, Messrs. Marsh and Robinson, was proposed by Mr. Pascoe and seconded by Mr. Maiden.—Carried unanimously.

Mr. Maiden proposed, and Mr. Duncan seconded: That the delegates be voted Rs.100 each, towards their expenses."—Carried unanimously.

3. *U.P.A.S.I. Registration Scheme.*—The meeting was of opinion that this was an excellent scheme as far as it went, and a move in the right direction, and they heartily supported the scheme.

4. *Hospital Affairs.*—As the Sub-Assistant Surgeon P. S. David had again returned to the Local Fund Hospital, the Honorary Secretary was requested to write to the President of the Local Fund Board and request that he be instantly removed. The Honorary Secretary was also requested to write to the Surgeon-General, Madras, and ask for an explanation as to why Sub-Assistant Surgeon Ibrahim Khan who had been ordered to this District according to order No. 296, had not arrived.

Mr. Simcock said that Government had refused him his applications for lands known as Blocks K_1 and K_3, explaining that Government had informed him that this Association had requested it to reserve these particular lands for public purposes. The Meeting did not know with what object Government had reserved the lands in question, and directed the Honorary Secretary to write to the Collector of Coimbatore to the effect that: "This Association defined the block of land that it requested Government to reserve for public purposes, namely Block K_2., the boundaries of which are as follows:—

Situated between Estates Nos. 13, 7, 20, 8 and K_1, and that it never requested any land to be reserved for public purposes in Blocks known as K_1 and K_3. The Chairman was also asked to sign this letter to the Collector of Coimbatore.

5. *Subscriptions* 1912-13.—The subscriptions for the year havtng already been paid, the Honorary Secretary was requested to send out bills for the balance of enhanced subscriptions, and, in the meanwhile, to pay the Associations subscription, on the 2 anna basis, to the U. P. A. S. I. out of the Funds.

6. *Postal Affairs.*—The Honorary Secretary was requested to again remind the Post-Master-General of his letter No. 60 of date 29th September 1912.

7. *Election of Planting Member.*—The Honorary Secretary was asked to write to the Secretary, U. P. A. S. I. for proper voting forms.

8. *Roads and Communications.*—Colonel Ellis' suggestions were agreed to by the meeting, and Messrs. Marsh, Simcock and Robinson agreed to take up contracts for the roads in which their respective estates were interested. These gentlemen's names were to be submitted to Col. Ellis who should give the mileage to be taken up. As regards Bridle paths—it was unanimously agreed that the rates proposed for the upkeep of these Bridle paths, which had now got into such a bad state of repair, was quite inadequate, and an allowance of Rs.75 per mile, for the important Villoni Bridle path was suggested, and Rs.40 to Rs.50 per mile for the remaining district Bridle paths. Messrs. Duncan, Marsh, and Simcock agreed to take up the contract for the Bridle paths in which their respective estates were interested. Mr. Duncan spoke very strongly on the importance of the Villoni Bridle path, it being the only " Road " which Government had given to feed 4 estates of some 4,000 acres and it therefore deserved the serious attention of the P.W.D. when making allowances for the upkeep of Bridle paths.

It was unanimously agreed that owing to the District now becoming so large that it was already beginning to feel that the present means of transport into it was quite inadequate for supplying the labour with grain and supplies. The Honorary Secretary was requested to write to the Collector of Coimbatore and ask him about the right of diverting the Alliar River from above the falls of Lower Poonachi to the vicinity of the paddy fields below with a view of harnessing the same for electric power to work a wire rope-way up into the District.

9. *Access to New Estates. Converting of Government Bridle paths into Cart Roads.*—It was unanimously resolved that in the case of widening out, and constructing Government Bridle paths into cart roads, that all parties interested in Blocks fed by these paths should pay proportionately on the total area granted, and with regard to *maintenance—the estates interested should pay proportionately on the area under cultivation.*

That these Bridle paths remain as Bridle paths, and as Bridle paths only, to the public.

That in the event of other interests coming in afterwards and wanting to use these roads, *that they come in paying a pro rata* charge of the construction and maintenance.

That the construction of new roads, and the maintenance of the same, be treated in a like manner.

The Association was unanimous in thinking that the following Bridle paths be reserved for possible conversion into cart roads :—

1. Iyerpadi to Castlecroft and Sirakundra.
2. Castlecroft to Sirakundra.
3. Stanmore to Sirakundra.
4. Stanmore to Puthutote and Castlecroft cart road.

A sketch map of the proposed routes for roads to the new estates would be drawn up and submitted to the Collector of Coimbatore.

10. *Election of New Members.*—Messrs. Fowke, Hayne and Sampson were elected new members.

With a hearty vote of thanks to the Chair, and to Mr. Marden for his hospitality, the Meeting closed.

(Signed) HATTON ROBINSON,
Honorary Secretary.

The world's supply of rubber in 1911 amounted to about 76.000 tons (or 88,000 tons including guayule), nearly all of which was consumed; the production in 1910 was 70,000 tons. About 850,000 acres are now under rubber in the East, and about 80,000 acres in Mexico, Nicaragua and Honduras. Exports from Brazil, Bolivia, and Peru were 39,500 tons in 1911, against 40,500 tons in 1910; about 9,200 tons of guayule were exported from Mexico last year. Exports from Ceylon and India amounted to 2,750 tons, from Malaya 11,400 tons, and from the West African Coast about 15,000 tons.

Imports etc.. of all kinds of rubber into England were :—

	Imports. tons.	Deliveries tons.	Stocks, Dec. 31. tons.
1909 ...	24,563	24,225	1,848
1910 ...	32,659	29,980	5,231
1911 ...	33,964	34,054	3,954

Imports of Pará (Manaos) rubber into England were 11,726 tons in 1911, 12,433 tons in 1910, and 10,179 tons in 1909; and of Peru (Cauchu) 3,753 tons in 1911, 5,577 tons in 1910, and 4,630 tons in 1909. Of East India and Malay plantation rubber, 10,656 tons were imported into England in 1911, as compared with 6,958 tons in 1910 and 3,607 in 1909.—*Journal of the Society of Chemical Industry.*

RULES FOR THE ELECTION OF AN ADDITIONAL MEMBER BY THE PLANTING COMMUNITY.

1. On receipt of an intimation that an election is to be held, the Secretary to the United Planters' Association of Southern India shall without delay send, by registration post, to the Secretary to each affiliated Planters' Association a notice that an election is to be held on or before such date as the Governor may appoint in this behalf.

2. Upon receipt of the notice referred to in rule 1, the Secretary to each of the said associations shall without delay send to each member of his association a notice that a meeting of the members of the affiliated association will be held at a specified place and time and on a specified date, which shall be not less than ten clear days before the date referred to in rule 1.

3. (1) At the meeting held under rule 2 each member of the affiliated association shall be entitled to give one vote for one candidate for election to the Madras Legislative Council.

(2) Any person not ineligible for election under these regulations who is a member of one of the Planters' Associations affiliated to the United Planters' Association of Southern India, shall be eligible for election.

(3) The voter shall record his vote on a voting paper, whereon he shall write the name of the person voted for and his full signature, and shall place the voting paper in a ballot-box.

(4) As soon as, in the opinion of the member presiding at the meeting, sufficient time has elapsed to enable the voting to be completed, he shall ask whether any member present has not yet voted, and shall call upon such member to vote within such time as the member presiding may fix.

(5) If there is no member present who has not voted, or on the expiry of the time so fixed, the presiding member shall open the ballot-box, count the votes and, after rejecting any voting papers not prepared in accordance with this rule, shall announce the result of the ballot to the meeting.

(6) In case of an equality of votes for two or more persons, the presiding member shall have a second, or casting, vote.

4. Immediately after the conclusion of the ballot under rule 3, the Secretary to the affiliated Association shall report the result thereof by registered post to the Secretary to the United Planters' Association of Southern India.

5. Upon receipt of the reports under rule 4 from the affiliated associations, the Secretary to the United Planters' Association of Southern India shall give to the vote of each of the affiliated associations the value assigned to it by the rules framed by the United Planters' Association of Southern India to regulate voting at general meetings of that body, and shall determine which candidate has received the largest number of votes as so valued.

6. In the event of two or more candidates for elections receiving an equal number of votes, as determined under rule 5, the Secretary to the United Planters' Association of Southern India shall report the fact without

delay to the Chairman of the said Association or, in his absence, to the Vice-Chairman of that Association and the Chairman, or Vice-Chairman, as the case may be, shall have a casting vote.

7. The voting papers given in at the meetings held under rule 3 shall be sealed up and retained by the Secretaries to the affiliated Associations for six months and shall then be destroyed.

8. The Secretary to the United Planters' Association of Southern India shall forthwith report by registered post the name of the person elected to the Secretary to the Government af Madras in the Legislative Department, and the name of the candidate elected shall be published in the *Fort St. George Gazette*.

RUBBER

Canker of Hevea Rubber.

LECTURE TO KALUTARA PLANTERS BY MR. PETCH.

Mr. T. Petch said : I may congratulate the members of the Kalutara Planters' Association on the fact that it is now eight years since the Government Mycologist addressed them, I am not quite so certain how to regard the coincidence that the subject on which information is sought to-day, that is, Hevea canker, is the same as that on which you were addressed eight years ago. Of course, we have discovered more about the disease since then, but the main difficulty experienced by the planter appears to be still the more elementary point, how to recognise it. The outward indications of canker are, as a rule, not remarkably conspicuous—a slight darkening of the bark, or in more advanced cases an exudation of a brown, rusty liquid. But if any suspicious-looking patches are lightly scraped so as to remove only the outer corky layers, the indications of a canker, if present, are immediately revealed. On normal Hevea bark, the layer which underlies the cork is usually green, and the laticiferous layer is white, yellowish, or clear red. Consequently, when healthy bark is scraped, the first living layer met with is green, and if this is cut away the inner layers are found to be white, or clear red, or mottled red and white. But, when cankered bark is scraped, the layer immediately beneath the cork is black ; and if that is cut off the laticiferous cortex is seen to be a dirty red, which changes rapidly to dirty claret-coloured. Usually the discoloured patch is surrounded by a black line, and it is often mottled with black. I have here a painting which shows characteristic Hevea canker in its fully developed form after the outer layers of the cortex have been cut away. There is an earlier stage than this, in which the diseased cortex is a greyish yellow colour and appears sodden. These patches are usually surrounded by a dark line as before. Here is some possibility of making a mistake over the earliest stage. There are certain types of cortex which are greyish-yellow and yet not diseased. For example, there is a smooth-barked tree which yields very little latex and has a greyish-yellow cortex which is somewhat granular; but, as that type of cortex occurs over the whole tree and yet the tree continues to flourish, it cannot be due to canker. There should not be any difficulty in distinguishing that type of cortex from early stages of canker, if it is remembered that the latter occurs in patches, clearly distinct from the general internal colour of the cortex. The

CLARET COLOURED STAGE OF CANKER

is unmistakable, and with a little practice the earlier state is equally readily recognised. There is no long interval between the two stages ; when I say "earlier" I only mean earlier by a few days. The disease begins in the outer layer of the cortex and gradually penetrates to the cambium. At the same time it spreads up and down and round the tree. It travels more rapidly up and down than laterally, and in some cases forms a patch two or three feet in length on one side of the tree only. The wood beneath the canker patch is discoloured, but chiefly by fungi which follow the canker fungus. In diseases like this, the wood appears to be poisoned by the products of decay of the cortex rather than destroyed by the fungus which causes the disease. When the cortex and the outer layers of the wood are killed right round the tree, of course it dies. The diseased cortex is moist and has a peculiar smell. Boring beetles are often attracted by it, and we receive numerous samples of supposed damage caused by borers which turn out to be cases of canker. It is safe to say, on our present knowledge, that all the borers found in the stems of Hevea follow a previous attack of fungus disease of some kind, usually canker or pink disease. Cases of canker such as I have just described practically never show any cracks or scales on the diseased patch. The surface is quite smooth and unbroken, and the first thing the planter notices is that a brown liquid exudes, or the stem is attacked by borers. If the canker occurs between or along the tapping cuts, he may notice that the latex does not flow. No latex exudes from cankered bark, but, of course, that is not necessarily a sign of canker. But a tree should be examined for canker whenever the latex does not flow, especially if it flows from one or two cuts and not from the others. Two years ago I should have concluded my description of canker at this point. But recently other appearances of the disease have been noted. In the cases just described—what I should regard as the normal case—the disease, if untreated, progresses until the tree is killed; and the tree dies with its cortex unbroken. But I have seen several cases lately in which the tree has begun to heal itself; and in those cases the appearance (that is, after the healing process has set in) is not the same as in normal canker. From experience of Heves in Cacao, I have always opposed the idea that there could be any extensive self-healing, but from what I have seen this year I must admit that it can occur, at least in the low-country in a season like the present. Indeed most of the canker found at this date is in course of healing. The course of events in these cases runs as follows:—The fungus begins its attack on the outer layers of the cortex in the ordinary way. It produces the usual coloured patch, and penetrates, say, to half the thickness of the cortex. Then it stops, and the tree begins to cut out the diseased patch by a layer or cork cells. While the disease is advancing, the symptoms are just the same as those already described— the diseased patch is claret-coloured and soft. But, when the tree begins to cut the dead tissue, the appearance changes.

THE DEAD PART DRIES UP AND BECOMES BROWN

internally, and it forms a scale which can be easily removed. The inner side of the scale is usually moist and covered with a soft white layer. That layer is not fungus, but newly-formed cork cells. Beneath the scale, the cortex is healthy and yields latex, but its surface is usually rough. When the scale dries, it frequently cracks, so that the result is a cracked scaly patch, quite different from the canker in its progressive stage. It is often difficult to say whether a scaly patch has been caused by canker or not, once the scales have become dry. If a patch of dead bark is found embeded in healthy cortex, that is almost certainly a self-healed case of canker. At the present time it would be preferable to treat all scaly bark as possible old cases of canker. But the disease should be found at an earlier state than this. Why the fungus does not continue to grow and ultimately kill the tree in these cases can only be surmised; personally, I should think it a result due to the weather, but it is open to anyone to argue that the fungus has become less virulent or the tree more resistant. I may here remark that, if the mycologist is to identify a case of canker from a sample of bark only, he must receive it within 24 hours of the time of taking it from the tree. If the sample is left on the verandah for two or three days, or if the V. A. motors it round the district and posts it at the end of the week, the diagnosis is a matter of chance. Of course, it would be possible to make a correct determination even in that case, given about a month's work on the specimen for fixing, embedding, section cutting, staining, etc.; but we cannot afford that, and it is quite unnecessary if the sample is posted immediately in a tin [illegible]

THE FUNGUS.

The fungus which causes canker is a *Phytophthorn* a member of the same family as the fungus which is the cause of the most serious potato disease. It cannot be detected without microscope; it does not produce any large fructification or strands of mycelium as *Fomes semitostus* does. Here are drawings of various stages of the fungus. It permeates the diseased tissue, and ultimately puts out a small tuft of threads, which produce lemon-shaped bodies known as sporangia. These sporangia become detached, and are washed away by the rain or blown away to other trees. If the sporangium falls on a wet surface, its contents divide up into a number of small masses of protoplasm. Then the apex ruptures, and these [illegible] are extruded. Each is provided with two threads, which are in constant movement, and with the aid of these it swims about the film of water. These bodies are called zoospores. Ultimately they come to rest, round off and enclose themselves in a cell wall, and finally germinate like ordinary spores. The germ tube, or primary thread, bores into the cortex of the Hevea, and so reproduces the disease. That is the typical life cycle, but there may be variations. The sporangium in some instances does not produce zoospores, but behaves as an ordinary spore. And under certain conditions, the fungus produces "resting spores" thick-walled spores—which preserve it through the dry weather. Such resting spores are formed within the diseased tissue. They carry the fungus over from one wet season to the next, but the chief means of spread during the wet weather is the sporangium and the zoospores. In addition to causing Hevea canker, the same fungus

ATTACKS HEVEA FRUITS,

and produces the well-known pod disease. It is to be expected, therefore, that an extensive attack of pod disease will be followed by an increase of canker. Arguing from analogy with the cacao disease, some part of the dying bark of green branches which occurs in connection with the pod disease is due to the same fungus, but that has not been definitely established. The fungus of Hevea canker is the same as that which causes Cacao canker, and the symptoms of the two diseases are practically identical. In cacao, however, where the fruits are borne on the old wood, the disease travels from the fruit into the stem through the stem of the pod. That does not occur in Hevea, or at least, the fungus does not travel from the fruit, down the branches into the main stem. I am often asked why canker should occur in districts where there is no cacao? Well, why did it ever occur on cacao? There is no doubt that it is a native fungus, and I believe that it is identical with the species which attacks bread fruit, but that point has not been proved by infection experiments. Aother similar fungus attacks arecanuts in South India, but Coleman has proved that that is not the same as the one on Cacao.

THE METHOD OF TREATMENT

advised in 1904 remains the only possible one. The diseased cortex must be cut out and burnt. Where the disease is discovered in an early stage, before it has penetrated right through the cortex to the wood, it is sufficient to scrape or cut off the cortex until healthy laticiferous tissue is reached. Such scraping can be done with a piece of hoop iron. If all the disease could be discovered in that stage, it would do very little damage. Where the wood beneath the patch is discoloured a thin shaving might be removed, but I do not think it is worth while to cut away much of the wood. Cutting away the wood, if done smoothly, will not do any harm, but in all probability it is not worth the time. In cases where the tree has healed itself, that is, where the cankered. bark is scaling off, all scales of dead bark should be shelled out. The fungus in those scales is dead, but there may be resting spores there, and I have seen cases in which the disease has commenced agains under the old scale. Of course, that may have been a reinfection ; water lodges behind these scales, and in that way they form admirable points of attack for the fungus. It is often necessary to cut away any healthy bark in such cases ; the scales shell out, and that remove all the dead diseased tissue. It would be well to paint the wounds with Bordeaux mixture, made according to the usual formula. If the wound does not extend to the wood, there is no necessity to cover it with anything ; the tree very soon forms a protective layer of cork over it. If the wood is exposed, the wound should be covered with cow-dung and clay. Very large wounds should be tarred in the middle and plastered with cow-dung and clay round the edges. We are badly in need of some protective which can be applied to exposed wood without injury to the surrounding healthy bark. Tar undoubtedly kills the surrounding bark and to some extent retards healing; consequently, I do not think it can be safely applied to small exposures on the tapping surface. There appears to be some hope of success with the sediment from Bordeaux mixture, made adhesive by means of a resin compound, At present I should advise painting small wounds with Bordeaux mixture, and then covering with cow-dung and clay. When the wood has begun to decay it is often difficult to keep out boring beetles. Some flowers of sulphur mixed with the cow-dung and clay will prevent their attack to some extent. Some planters have used kerosene or bulk oil for that purpose, but my experience is that all oily substances soak into healthy Hevea bark and kill it.—*Ceylon Times.*

(*To be continued.*)

RUBBER EXPORTS FROM CEYLON.

The following statistics of the exports of rubber of domestc production from Ceylon during the years ended June, 1911 and 1912, have been, extracted from official returns issued by the Ceylon Government :—

To	July-June, 1910-11. lb.	July-June, 1911-12. lb.
United Kingdom ...	2,888,032	5,712,339
United States ...	2,112,768	2,814,772
Other countries ...	427,280	1,566,907
Total Exports	5,428,080	10,094,018

—*Journal of the Society of Chemical Industry.*

The Planters' Chronicle.

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THE U. P. A. S. I.

(INCORPORATED.)

Intimation having been received from the Government of Madras that the election of a Member of the Planting Community to the Legislative Council of Fort St. George should take place on or before December 16th, notices have been sent out asking Honorary Secretaries to convene meetings as early as possible. The Rules regulating the election of the Planting Member were published in this paper on November 2nd. It is an advantage to get the result of the election published as early as possible.

Continued and ended in this week's issue is Mr. Petch's highly interesting lecture on the Canker of Hevea Rubber.

A good deal of space is taken up in this issue by the correspondence between Mr. Scoble Nicholson, Ceylon Labour Commissioner, the Chairman United Planters' Association of Southern India, and Mr. Aylmer Ft. Martin through the Secretary.

Mr. Graham does not take a sanguine view as to the future of Coffea Robusta and Mr. McKenzie draws attention to the inevitable downfall of coffee in Brazil if despoiling the bush of foliage during the flowering season is persisted in.

A reply to the Resolution on Telegraphs, passed at the last Annual Meeting, is published from the Government of Madras, Public Works Department.

The Scientific Officer furnishes two articles of value to those interested in Camphor and Coffee.

Scientific Assistant for Coorg.—Mr. L. G. Jonas, the Scientific Assistant for Coorg arrived in Bangalore on 30th October, his boat being four days late. Under these circumstances the meeting at Mercara to welcome him has been postponed until November 14th. Mr. Jonas and the Scientific Officer will leave for Coorg on 11th November, making a short stay at Hunsur on the way, to inspect the Coffee Curing Works, etc., and in connection with the advent of Mr. Jonas, a paper published in the *Chronicle* of October 26th on page 586 under the heading of The Direct and Indirect value of Scientific Work, is of the highest importance to every District Association. It is to be sincerely hoped that in the near future every District Association will be employing one or more Scientific Assistants according to their acreage, under the direction of the Scientific Offieer of the United Planters' Association.

A very bad case of a Labour Recruiter, absconding with a large sum of money has just been brought to the notice of the Secretary, who hopes with the sanction of the gentleman, who has been defrauded, to give fuller details next week and by publishing the recruiter's name warn others who may be intending to employ him.

CORRESPONDENCE.

Ceylon Labour Commission,
Trichinopoly, 10th September, 1912.

No. A/6671.

The Secretary,
South Indian United Planters' Association, Ltd.,
Bangalore.

Dear Sir,—With reference to the enclosed Circular which I understand, emanated from your Association for the information and enlightenment of coolies who are possibly seeking to emigrate to Ceylon and other countries, I would request your Association to be good enough to remove the document from circulation, seeing that as far as Ceylon is concerned in any case, it is not an accurate statement as regards the methods of Ceylon Recruiting. In this connection one of your members, Mr. A. F. Martin, was kind enough to call upon me on 24th August, 1912, informing me that he was closely connected with the authorship of the circular; he gave me to understand that he thought that your Association would at any rate remove anything considered objectionable that the circular contained in connection with Ceylon recruiting, and that he would, although he holds no official position at present in your Association, use his friendly influence to that effect.

I feel sure that it cannot be the wish of your Association to further any campaign that would place Ceylon in an unfair position, recruiting as we have done side by side for so many years quite amicably. As regards the methods of individual Ceylon recruiters, I may say, that it is only necessary for your Association to represent any unfair or irregular methods which have been or at any future period may be considered detrimental to the interests of Southern Indian recruiting, for them to receive my close attention and report to my Kandy Committee so that they may use their influence to put matters right. It is my intention, as Ceylon Labour Commissioner, to exercise my influence to prevent the distribution of circulars advertising Ceylon within the boundaries of your planting districts, and to prevent as far as possible recruiting in these districts. I trust that this being the case, your Association will see their way to withdraw from circulation a document which translated into the vernacular is calculated to adversely affect Ceylon recruiting by criticisms which as I have said before, are not applicable to Ceylon. Mr. Martin informed me that the circular in question was aimed at no country in particular but at the methods of native recruiters generally. I would point out that the contents of the circular may succeed in conveying that impression if taken in a wide sense, but if read from the vernacular by the cooly proposing to proceed to Ceylon it can only convey to him an absolutely false impression of conditions of labour in that country.

In conclusion I would point out that all coolies recruited for Ceylon who pass through the agencies of my Commission are fully informed as to their pay and prospects when working on our estates, and I would say that the methods of Ceylon recruiting generally speaking will bear a very thorough and searching investigation. I shall be glad to hear from you at an early date that your Association can see its way to fall in with the suggestion of Mr. Martin, undertaking to delete all objectionable matter from your circular. Indeed, I would go further than this and ask you in justice to a neighbouring

Colony with which the interests of Southern Indian Planters are, in a great measure bound up, to consider the advisability of recalling that circular altogether.

Yours faithfully,
(Signed) H. SCOBLE NICHOLSON,
Ceylon Labour Commissioner.

25, South Parade,
Bangalore, 11th September, 1912.

H. Scoble Nicholson, Esq.,
Ceylon Labour Commissioner,
Trichinopoly.

Dear Sir,—I have to acknowledge your letter of 10th September, 1912, to which was attached a circular in Tamil. I am to-day despatching copies of your letter to Mr. Abbott, Chairman of the United Planters' Association of Southern India, and to Mr. Martin, and on receiving instructions from the former I will at once communicate with you.

Yours faithfully,
(Signed) FLETCHER NORTON,
Secretary.

25, South Parade,
Bangalore, 11th September, 1912.

C. E. Abbott, Esq.,
Chairman,
United Planters' Association of Southern India,
Meppadi P. O.,
Wynaad.

Dear Sir,—In accordance with para. 5 of the Memorandum of instructions given to me on August 19th, 1912, I beg to enclose copy of letter received to-day from the Ceylon Labour Commissioner, Trichinopoly, to which was attached the Labour Circular in Tamil to which the Commissioner refers. I do not forward this, as I presume you have one.

I am sending a copy of the same letter to Mr. Martin, and have asked him to place himself in communication with you, from whom I hope to receive final instructions as to how you wish me to reply. I am writing the Ceylon Labour Commissioner that I am referring the matter to the Chairman and Mr. Martin and will reply more fully at a later date.

Yours faithfully,
(Signed) FLETCHER NORTON.
Secretary.

Ceylon Labour Commission,
No. A/6800. Trichinopoly, 12th September, 1912.

The Secretary,
United Planters' Association of Southern India,
Bangalore.

Dear Sir,—I am in receipt of your letter of the 11th September, 1912 and duly note its contents.

Yours faithfully,
(Signed) H. SCOBLE NICHOLSON,
Ceylon Labour Commissioner.

25, South Parade,
Bangalore, 26th September, 1912.

H. Scoble Nicholson, Esq.,
Ceylon Labour Commissioner,
Trichinopoly.

Dear Sir,—Referring to yours of the 10th instant and mine of the 11th instant in reply to it, I beg to inform you that the Chairman of the United Planters' Association of Southern India, to whom I forwarded a copy of your letter to me writes me as follows:—

"I have read Mr. Nicholson's letter of 10th instant sent with yours of 16th on the subject of the U. P. A, S. I. circular and the methods of Ceylon Recruiters. I hoped to get Mr. Martin to reply, but as he is away from his Headquarters I will try and explain our position in these matters.

"*The Circular.*—What Mr. Martin promised to do was to get the circular altered if Mr. Nicholson could *prove* that it was unfair to Ceylon. The Ceylon papers have merely called it bad names, and Mr. Nicholson's letter does not specify what particular statement is incorrect. Will he definitely tell us what it is he objects to? The circular was not intended to encourage emigration to Ceylon, but as Mr. Martin says, it was not directed against any particular country. It was published to show coolies that they could do better by staying in India than by going abroad.

"*Unfair Recruiting.*—The U. P. A. S. I. has never had the slightest personal grievance against Mr. Nicholson or his predecessor. But it is rather too much to ask us to treat the most atrocious case of crimping by some native sub-agent (who is repudiated by his own employer) as he and the Colombo Press ask us to, and behave as if we had detected some valued friend straying from the path of virtue, and merely utter a murmur of surprise and sorrow, or at most write in confidence to his employers or the Ceylon Association. What has happened in the particular case referred to does not encourage us to take this line. From the interview "The Times of Ceylon" had with Messrs. Carson that Firm appear to be blatantly unrepentant. As for the Ceylon Planters' Association it has done nothing to repudiate the remark in one of the Colombo papers that Mr. Goodfellow's methods were quite smart and that the Shevaroy Planters are a set of fools who ought to be ashamed of having complained of them."

I have only to draw your particular attention to the Chairman's sentence under the heading of Circular: "Will he definitely tell us what it is he objects to?"

On hearing from Mr. Martin I will communicate further with you.

Yours faithfully,
(Signed) FLETCHER NORTON,
Secretary.

25, South Parade,
Bangalore, 28th September, 1912.

H. Scoble Nicholson, Esq.,
Ceylon Labour Commissioner,
Ceylon Labour Commission,
Trichinopoly.

Dear Sir,—The Chairman has sent me the following letter from Mr. Martin replying to yours of 10th instant, which I trust will satisfy you that this Association is willing to consider any alterations you may wish to have made in the circular consistent with the ground it has taken up, on the question of Emigration beyond the sea.

This Labour question is one in which the whole planting community of Southern India is deeply interested, and with your permission, I should like to publish the correspondence in the *Planters' Chronicle*—the official organ of the United Planters' Association of Southern India.

Trusting you will permit me to do so.

I am, dear Sir,
Yours faithfully,
(Signed) FLETCHER NORTON,
Secretary.

Srivllliputtur,
Ramnad District, S. I.,
19th September, 1912.

The Chairman, U. P. A, S. I.,
Meppadi, Wynaad, Malabar.

Dear Sir.—With reference to Mr. Scoble Nicholson's letter which has come just as I am preparing to go into camp, my attention being thus divided, I fear I cannot do proper justice to it.

The Ceylon Labour Commissioner says the advertisement is not an accurate statement as regards the methods of Ceylon recruiting. He is already aware from me that the circular is not aimed only at Ceylon, but at all countries across the sea for which labour is recruited from S. India.

I gave Mr. Scoble Nicholson to understand if there was any particular statement in the advertisement which could be shown to be 'unfair' to Ceylon, I would use what influence I possess to have that statement altered or eliminated, Mr. Nicholson himself suggested the word 'unfair' and I thought it particularly appropriate as opposed to such words as 'objectionable' or 'offensive.' I also told him we would continue circulating the advertisement. It is quite true that for years, Planters in S. India and Ceylon have recruited side by side quite amicably. But ever since the enormous extension in the acreage of rubber in Ceylon, the recruiters for that country have introduced methods which are distinctly unfair to S, India. There could be no possible complaint on the part of S. Indian Planters, so long as Ceylon recruiters stuck to the Kangany system of recruitment, the patriarchal character of which is so well described on the first page of the report of the Ceylon Labour Commission, 1908.

There may be, and no doubt are, many estates in Ceylon still working under this excellent system, but speaking generally it has been abandoned, and 'haphazard recruiting' is now prevalent. See page XI of the report above mentioned. See also Goodfellow's circular. This change in the policy of Ceylon necessitated a change of policy on the part of employers of labour in South India. While recognizing that every labourer has a right to go where he thinks he can make the best living the U. P. A. S. I. approached the Madras Government with a view to (1) prevent advanced labourers leaving the country. (2) control emigration to such extent as to make sure that labourers going across the sea really understand the conditions under which they will have to work. The Madras Government refused to take action on the ground that it was satisfied with the existing conditions. The U. P. A. S. I. were then forced to do what little they could for themselves, and it was decided to broadcast circulars setting forth the unfair methods of foreign recruiters, and the treatment of labourers once they had gone across the sea.

We are quite sure that in their own interests the Celyon Labour Commission at Trichinopoly combat in every possible way, such unfair recruiting and unfair treatment. The points to which we drew the attention of the labouring population are quite beyond the control of the Ceylon Labour Commission. We do not see how the Ceylon Labour Commission can prevent Indian professional recruiters from lying nor Kanganies from purchasing coolies at so much per head from these recruiters, nor control the 'tundu' system in Ceylon, by which coolies are sold from one estate to another, the price being fixed, not by the amount of money received by the cooly, but by the amount of the debt of their Kangany in which is often included (1) the cost of recruiting the coolies (2) the amount of money utilized by the Kangany himself, and probably (3) what is known as 'caddy debts' of the Kangany. The 'tundu' system may not have worked so unfairly under the old patriarchal Kangany system, but under the 'haphazard recruiting' system, it is only fair that coolies should be made aware of it before they leave South India. The action of the U. P. A. S. I. was forced upon it primarily by the change in Ceylon methods. We are of course thankful that it is the intention of the Commissioner to exercise his influence to prevent distribution of circulars advertising Ceylon and as far as possible to prevent recruiting within the boundaries of South Indian planting districts, but seeing the probable effect of our circularizing or attempting to recruit coolies within the boundaries of Ceylon planting districts, we cannot admit that the Ceylon Labour Commissioner's good offices in this respect, form sufficient grounds for our being asked to withdraw our advertisement. I would like to know what criticisms in that circular are not applicable to Ceylon—if they are unfair, they should, as a matter of course, be removed or altered. In issuing that advertisement we were careful (so far as it could affect Ceylon) to be guided, first by the Report and Proceedings of the Ceylon Labour Commission 1908, and secondly by information given more recently to the Ceylon Press by Ceylon planters. Such being the case we claim that the impression produced by the perusal of the U. P. A. S. I. advertisement on the mind of the possible emigrant to Ceylon, must be a fair and correct one, and in no way false. We have never aimed at any of the Ceylon Labour Commissioner's recognized agencies, where we have no doubt everything is done to inform coolies correctly, so far as pay and prospects are concerned.

The U. P. A. S. I. will, I hope, delete or alter any statement in the circular which is shown to be unfair to Ceylon, but we cannot agree to recall the circular altogether.

In adopting the 'haphazard' system of recruiting, Ceylon followed the lead of *all* other countries across the sea, but without introducing compensatory reforms in the position of the cooly on Ceylon Estates. The Straits Settlements Planters for instance start the cooly on the estate free of all debt,—and this compensates him, for the method of his recruitment in all respects except in the one of being trapped by false representations.

Yours faithfully,
(Signed) AYLMER Ff. MARTIN.

Ceylon Labour Commission,
Trichinopoly, October 10th, 1912.

Fletcher Norton, Esq.,
Secretary,
United Planters' Association of South India.

Dear Sir,—I am obliged for your letters of September 26th and 28th last which owing to pressure of work have escaped my acknowledgment.

I am giving the position my most careful consideration and will communicate with you later.

In the mean time, I should be obliged if you would refrain from publishing the correspondence in the *Planters' Chronicle* until such time as we have reached finality in the discussion which I sincerely trust will be satisfactory to both sides.

Yours faithfully,
(Signed) H. Scoble Nicholson,
Ceylon Labour Commissioner.

Ceylon Labour Commission,
Trichinopoly, 22nd October, 1912.

No. A/7975.

Fletcher Norton, Esq.,
Secretary,
United Planters' Association of South India,
Bangalore.

Dear Sir,—Adverting to my letter of 10th instant, I have read with interest Mr. Martin's letter to you of September 13th, and your letter of 26th September conveying to me the comments of your Chairman on my letter in which I asked your Association to withdraw from circulation a document which was calculated to be prejudicial to Ceylon recruiting in South India.

I cannot as suggested pick out any particular passage in the circular, as I consider the document as a whole if read in the vernacular by the indiscriminating coolie conveys to him an inaccurate idea of conditions prevailing on Ceylon Estates.

I regret that your Association is unable to comply with my request and such being the case there is nothing further to be said.

With reference to your Chairman's remarks under the heading of *Unfair Recruiting*, I can only repeat, that if on any future occasion, there are any grounds for complaint as to the unfair methods adopted by individual recruiters working for Ceylon, if your Association will be good enough to bring the matter to the notice of the Planters' Association of Ceylon in the usual way, it will of course receive their prompt and courteous attention.

In this special instance had the methods of Mr. Goodfellow, which you have called in question, been brought to their notice it could not have failed to elicit an investigation and the suitable notice of the Association, with perhaps more satisfactory results than have been obtained through the medium of the press, which has not tended to improve the situation or to allay friction on either sides.

I would advocate that in future matters of moment beween the two Associations should be freely ventilated by correspondence either direct or through this Commission. and I venture to predict that it will be conducive to the interests of both the Ceylon and South Indian Associations and will promote a mutual good understanding.

In this connection I should be very glad if an opportunity could be extended to me in order that I might meet your Chairmen and some of your District Chairman as I think that perhaps a free exchange of ideas will remove any misconceptions there may be to the attitude of Ceylon with regard to recruiting operations within the sphere of the South Indian Planting Districts.

Yours faithfully,
(Signed) H. SCOBLE NICHOLSON,
Ceylon Labour Commissioner.

25, South Parade,
Bangalore, 24th October, 1912.

H. Scoble Nicholson, Esq.,
Ceylon Labour Commissioner,
Ceylon Labour Commission,
Trichinopoly.

Dear Sir,—I have to acknowledge yours of 22nd instant. I note that as you recognise that this Association cannot withdraw the Circular entirely as you requested, nothing further can be said. Having arrived at this conclusion no good purpose will be served by recapitulating facts recently stated in the correspondence. We shall be doing more good in searching for a means of working amicably side by side, and to gain this end, the concensus of planting opinion will be with us, and I agree with you that a meeting between yourself and our Chairman (and any others he would nominate) would clear the atmosphere.

I am sending a copy of your letter to him, and referring to mine of the 28th ultimo I should feel much obliged if you would permit me to publish the correspondence in the *Chronicle*, for the information of our members.

Yours faithfully,
(Signed) FLETCHER NORTON,
Secretary.

Ceylon Labour Commission,
Trichinopoly, 25th October, 1912.

Fletcher Norton, Esq.,
Secretary,
United Planter's Association of South India,
Bangalore.

Dear Sir,—I am in receipt of your letter of 24th instant and am glad that you find yourself in accordance with my views as to an amicable settlement of differences that have arisen and which at any future period may arise in connection with the recruiting work of the South Indian and Ceylon Planters.

I have no objection to your publishing the recent correspondence in the *Planters' Chronicle* as you suggest.

I shall be probably proceeding to and from Ceylon during the first week of next month, but after that I shall be at liberty to attend any meeting that you are good enough to arrange in Bangalore.

Yours faithfully,
(Signed) H. SCOBLE NICHOLSON,
Ceylon Labour Commissioner.

October 30th, 1912.

To the Editor,
The Planters' Chronicle,
Bangalore.

Coffea Robusta.

Sir,—The first para. in your issue of October 26th, deals with this plant. In case any coffee planter may think that in South India planting districts "Coffea Rebusta" is going to be a huge success I can tell them that I bought in February this year, 30 lbs. of it which cost 67 8 on the estate. It was put down immediately and the seed germinated very slowly indeed; at this date it has two pairs of leaves only, so it looks if it might take 20 years to crop.

I am, Sir,
Yours faithfully,
(Signed) J. A. GRAHAM.

Prospect,
Naduvatum, Nilgiris, South India.
October 30th, 1912.

Coffee in Brazil.

The Editor,
Planters' Chronicle.

Sir,—If it be true, as reported by a Brazil correspondent, that it has been found advisable that the coffee bushes be denuded of foliage during the flowering season; then the doom of the coffee bush is within measurable distance in Brazil. For this means such a very severe strain upon the reproductive functions of the coffee bush as can only last for a few years, when a pest like that of the *Hemilea vastatrix* will take possession, and we shall have a repetition of the history of coffee as occurred in nearly every coffee district in Ceylon and India. Coffee is not a product-machine, but it is a real organism possessing its own function upon the normal exercise of which its health and its life depend. "Bumper" crop year after year without any rest means a serious overstraining of its function of reproduction at the expense of other equally important functions. That a tree should be devoid of foliage during its flowering season is suicidal.

Yours faithfully,
(Signed) J. MCKENZIE.

No. 9633 C.
Government of Madras,
Public Works Department.
From
The Hon'ble Mr. S. D. Pears,
Ag. Joint Secretary to Govt., P. W. D.,
(Buildings, Roads & Railways),
Madras.
To
The Secretary,
United Planters' Association.
25th South Parade, Bangalore.

Madras,
The 30th October. 1912.

Sir,—With reference to your letter dated 10th September, 1912, I am directed to inform you that the Telegraph Department has now under consideration a scheme for reducing the cost of Branch Telegraph lines by erecting them with material lighter than that hitherto used which will include Public Telegraph lines to Planting Districts.

I have the honour to be,
Sir,
Your most obedient Servant,

(Signed) W. F. MOLESWORTH,
for Ag. Joint Secretary to Govt. P. W. D.,
(Buildings, Roads & Railways).

TEA.

Tea-drinking is becoming more and more popular in France and it is marvellous the change that has come over the working man in abandoning the liquor on which he had practically been weaned for the "cup that cheers." In some parts of France, notably in Brittany, cider is the drink of the labouring classes, and being so cheap a large sized bottle (a *litre*) containing more than a quart in English measure, costing only a couple of *sous*, every working man carries a bottle to work with him. In other parts a cheap red wine is equally favoured. Within the last few years, however, tea is to a large extent replacing the national drinks and the only reason why it is not more universally favoured is because of its cost. It is much cheaper in France to drink liquor than tea, which is retailed at the prohibitive price of four to five francs a pound.

The duty on tea in France comes to about a rupee a lb. or a franc and a half, so that the grocer who retails tea makes an enormous profit on the cheap stuff that he gets five francs or over Rs.3 per lb. A tea planter who has just returned after a long holiday in France was so struck with these facts that he has made arrangements to shop a good quality of tea to Brittany and retail it there at less than the local grocer charges for a much inferior stuff. He is convinced that there is a large field open to any firm that goes in for this trade on a large scale with the increasing popularity of tea in France.—*Capital.*

THE SCIENTIFIC DEPARTMENT, U.P.A.S.I.

Camphor.—On page 357 *et. seq.* of Vol. VII of the *Planters' Chronicle*, a description of a Camphor Still was given. This was taken from a *Bulletin* published by the Agricultural Department of the Federated Malay States kindly forwarded by the Director. A great deal of interest appears to have been taken in the description of this Still, but one planter wrote to say that he could not get an estimate for the manufacture of the Still from the details published and the sketches forwarded to him and asked whether he could be put into communication with the makers. A reference to Mr. Lewton Brain, the Director of Agriculture in the Malay States has elicited the following kindly reply:—

"Regarding the Camphor Still which you wrote about in your letter 728/1912 of the 1st, ours was made partly by the Government Factory—partly by the Federated Engineering Company of Kaula Lumpur.

"2. I take it that you would only require the Still itself and the condenser made here, and would fit on your own boiler. Our present boiler is too large and is not economical.

"3. I have no doubt the Federated Engineering Company would quote you for a Still modelled on ours."

How to take Samples of Soil for Analysis.—The following simple rules are given by Dr. Olsson Seffer in *The Review of Tropical Agriculture* for May, and in all cases they should be carefully followed when a sample of Soil is taken to be sent to an analytical chemist for analysis:—

"Care must be observed in selecting the soils for Analysis as the surface soil is very much different to the sub-soil, and one part of the field varies from another.

"When we have an analysis made of our soils we want to know the condition of the entire field and not one part of it. The manner of taking these samples is as follows:—

"Having selected a piece of ground where the soil appears uniform in composition, dig a hole to the depth of one foot, making sure one of the walls of the hole is absolutely vertical: then take a slice of this vertical wall (about a spadeful taken in this manner will represent each layer of the soil), mix well and place in a central place. Several samples of the same sort at distances from each other, should be taken and then all mixed thoroughly together. Send at least 10 lbs. in a clean tin or wooden box. In case several samples are sent, each should be numbered, and the box marked with the name of the Estate.

"Samples should not be taken from recently manured ground, and great care must be taken to avoid such places when drawing samples.

"Information should be sent with the sample relating to the following questions:—

1st. The elevation and average rainfall.
2nd. General appearance and character of sub-soil.
3rd. What kind of drainage.
4th. Under which crops are the fields planted.
5th. Has any manure been used, and what kind.
6th. State any general particulars respecting the soil that may be considered desirable."

R. D. A.

COFFEE.

Annual Report of the Porto Rico Agricultural Experiment Station for 1911.

The following extracts from this report relate to Coffee.—

"The coffee crop during several years has varied with the character of the season. Comparatively little coffee has been planted, but there is better cultivation of the old plantings There will continue to be an improvement in methods and in the quality of our coffee, but it is not likely that there will ever be any great extension of the industry in Porto Rico It is true that the increased price of last year has given some encouragement to coffee growing, but other economic factors are causing a gradual change in the agricultural production of the island that is every year more manifest"

"In addition to the old plantings of Porto Rican coffee there are a number of introduced coffees Of the latter there are something more than 2,500 trees. Among species of coffee other than *Coffea arabica*, in its different varieties, are found *C liberica*, *C laurentii*. *C excelsa*, *C. macrocarpa*, *C stenophylla*, *C canephora*, *C zanguebariae*, *C. dewevrei*, *C liberica*, x *C arabica* hybrid *C mauritiana* x *C laurina* hybrid and several coffees of undetermined species

"The coffee trees in the transplanting experiment begun in August, 1909, are now showing some interesting differences The plants used were seedlings from the 1908 crop, When quite small they were taken from seed boxes and set in the nursery bed,

"In transplanting young coffee trees from the nursery bed with only five to six pairs of leaves, careful setting with the root system bare gave as good results as with the root system encased in the surrounding clod The tendency toward an earlier production was aided either by making the permanent planting when the trees were quite small, that is, less than a year old from seed, or by transplanting with the root system encased in the surrounding clod if the plants were allowed to remain in the nursery bed for a year longer A more even stand is likely to be secured by allowing plants to remain in the nursery bed a year longer than by transplanting when plants have only five to six pairs of leaves The cutting back and planting out as stumps of coffee trees less than 2 years old was very unsatisfactory where conditions were not very favourable for coffee culture.

"More time has been given to coffee diseases than to other subjects. In the work with the root diseases several new methods for preventing the trouble were tried, but it is yet too early to get definite results from these experiments. The diseases of the fruit, which make the preparation of the grain more difficult by causing the flesh to adhere, and which by spotting the grain, lower the quality of the product, have been studied and found to be due in part to improper shading and soil conditions As the leaf rot spreads most rapidly at the time of the heavier rains, and its rapidly growing mycelium is especially sensitive at this time, it is important that sprays applied during this season should adhere well For this purpose various adhesives were added to the Bordeaux mixture, among others the borax starch mixture, which has been strongly recommended for use in cacao plantations in regions of heavy rainfall. Ordinary Bordeaux mixture made up with but half the usual amount of water without the addition of adhesives was found to adhere better than Bordeaux of the usual delution mixed with any of those adhesives tried."

R. D. A.

RUBBER.

Canker of Hevea Rubber.

(*Continued.*)

The only other point is whether anything can be done to ***prevent*** the attacks of the fungus. The fungus attacks the fruit, and may be expected to do so every wet year. It is impraticable to treat the fruit; but after a serious out-break of the fruit disease, the fallen fruit should be collected and burnt. It is rather a matter for congratulation that tapping so far as the evidence goes, reduces the number of fruits. Some years ago a planter patented a latex protector, intended to prevent rain water falling into the cups. More recently a rain gutter has been brought out to prevent the rain water running over the tapped surface. The patentee of the latter claims that he can continue the tapping through the wet weather and obtain more rubber *per annum*. Its chief recommendation from the present point of view is that it stops the constant flow of water down the stem from the crown, and in that way may prevent decay on the tapped surface and canker. The germination of any fungus spore depends upon the presence of moisture, but in the case of ***Phytophthora*** it is especially necessary that the sporangium should fall on a wet surface. If the stem could be kept dry, there would be practically no canker. Of course, I know that it is impossible to keep the stem dry owing to the lateral drive of the rain, but these rain gutters would keep off some of the water. I am strongly of opinion that it would be worth while to experiment with these on a fairly large area. I have already

INSTITUTED SPRAYING EXPERIMENTS

with Bordeaux mixture. Our chief aim should be to protect the potential tapping area from canker; because the wounds made in excising diseased bark interfere with future tapping operations: and the best method of protection would be to spray the stem in the dry weather just before the monsoon to a height of six or eight feet. I recommended that to South Indian planters for several years as a preventive of "Pink Disease," and it has now been carried out at a small cost. There is no doubt of its efficacy against any fungus which attacks the tree above the ground; the only question is whether it will have any effect on the rubber through traces of copper compounds washing into the latex. Experiments have been begun to decide that point. Bordeaux mixture dries on the tree, and the copper compounds, which are gradually dissolved by the rain, kill the fungus spores which may alight on it. The amount of copper on the tree is very small, and the quantity brought into solution at any given time is infinitesimal. Hence it would seem improbable that any appreciable quantity would get into the latex. Rough-barked trees appear to be attacked by canker more than those with a smooth bark, and the deposit of Bordeaux mixture in the cracks would be an effectual preventative. Spraying does not increase the proportion of scrap, nor does it stain the rubber, but I must wait until the rubber has been analysed before deciding whether it can be unreservedly recommended. In case spraying can be recommended, the following details may be given now: Solutions containing copper compounds must be made in wooden vessels. Only a few weeks ago I came across an instance in which the copper sulphate was being dissolved in an iron cauldron If that is done the mixture contains no copper at all and it is quite worthless.

THE QUESTION OF SPRAYERS

is a difficult one. In a case like this, where it is desired to put as little copper as possible on the tree, sprayers must be used. If the mixture is applied with a brush too much is put on. Moreover it takes a long time to paint a tree, whereas the stem can be sprayed in less than a minute. The type of sprayer generally used in temperate climates consists of a tank filled with the liquid which is pumped out as required; the operator carries the sprayer on his back, pumps with one hand and directs the jet with other. This is undoubtedly the best type; but it has always been stated in Ceylon that "a cooly will not work with both hands. The Four Oaks sprayer is of that type; and as it has been strongly recommended in Southern India, it seems probable that the cooly difficulty has been exaggerated. Another type of sprayer is filled under pressure, and the cooly has only to direct the jet. But the sprayer of that kind used in Ceylon is not a success. As the liquid is under pressure, the slightest defect in the hittings of the jet results in excessive waste, and as much falls on the ground as is put on the tree. There is no means of agitating the liquid in the tank, consequently the copper compound settles and cakes at the bottom; and, as the pressure falls, it fails to drive out a large proportion of the liquid. But the most serious objection is that more than half the cooly's time is taken up with the process of re-filling. With the ordinary sprayer the liquid is simply poured into the tank, an operation which takes less than a minute; but the pressure sprayer requires anything up to a quarter of an hour. There is another type of pressure sprayer in which the liquid is poured in, and the pressure obtained by pumping in air; that is less objectionable, but with regard to waste it is as unsatisfactory as the other. Whatever sprayer adopted, it should be capable of being taken to pieces, especially the pump part of it. Personally I consider that the best apparatus is a Deeming pump fitted on a small barrel. That requires two coolies, but a greater quantity of the mixture can be taken, and less time is wasted in re-filling. The jet should be of the Vermorel type. The straight jets used in cacao spraying were made under a complete misapprehension of what was required in spraying operations.

COLLECTING SPOUTS SHOULD BE REMOVED

before trees in tapping are sprayed; if they are not, the latex collected immediately afterwards will be far more likely to contain copper compounds. (Laughter.) Finally I may once more urge the necessity of training two or three coolies to detect canker, and to treat it when it first appears. It is not a disease to be alarmed about, provided that it is treated in the early stages. I am confident that on the majority of estates a sanitary gang would quite repay its cost. The cooly proved quite efficient in detecting and treating cacao canker, and there is no doubt he would be equally capable of dealing with the same disease on Hevea. It was suggested, eight years ago, that the Mycologist should inspect every rubber estate once a year. That, of course, is physically impossible, if the inspection is to be of any value. Moreover, it is not the work of a mycologist. A mycologist has to investigate a disease, discover the cause, and prescribe remedies and when he had finished one, there are always others awaiting attention. If his time is taken up with the inspection of known diseases, investigation ceases. To a great extent, the two duties are incompatible, and in any branch the investigator can only inspect for the purpose of extending or completing his investigations: he inspects to obtain knowledge. What estates want is not a mycologist so much as an inspector who is fully acquainted with all the known diseases and can advise as to treatment. When the inspector discovered any disease which was new to him, he would bring it to the notice of the mycologist for investigation.—*The Weekly Times of Ceylon.*

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THE U. P. A. S. I.

(INCORPORATED.)

A Meeting at Coorg.

A Meeting of the Coorg Planters' Association was held at Mercara, on 14th November, to welcome the Scientific Assistant for Coorg, Mr. L. G. Jonas, who has just arrived in India. In introducing him, the Scientific Officer, Mr. R. D. Anstead, B.A., spoke as follows:—

Mr. Chairman and Gentlemen,—It gives me much pleasure to be present at this meeting and joining with you in welcoming the Scientific Assistant to Coorg upon his arrival in this District.

If you will allow me to do so, I should like to make a few suggestions to you as to how you can best utilise your Assistant now that you have got him; and I will preface my remarks by reminding you that before a man can teach he must learn. You have decided, wisely as I most firmly believe, to supplement the Scientific Department of the U. P. A. S. I. by having a man of your own to look after your Scientific welfare and make a special study of your own particular problems. Those problems are many and I would ask you to remember that in addition to brains and energy, patience and time are necessary for their solution, and so I trust that you will not keep your Assistant constantly rushing about the District, but give him a chance to concentrate his energies on a few special problems at first and to do a little steady research work. One problem solved is worth more to you than half a dozen dabbled in and dropped to take up something else.

In my opinion the most important problem of all for Coffee planters is the manurial one and I trust that this will now be studied in a systematic way, from three points of view, what manures to apply, what quantities to apply, and when to apply them. I hope to see a number of definite experiments carried out in the field designed to answer definite questions. With the grant from the Kalisyndicate we have an excellent opportunity to begin work and I hope that this grant will form a nucleus round which a system of manurial experiments of a practical nature, will crystallise.

In the case of Ceará Rubber, Coorg is already in an advanced state of knowledge and I think that the immediate problems to study are how to increase the yield of the tree and to reduce the cost of of production. With regad to tne former there are two lines of study which I wish to suggest to you; first the influence of soluble fertilisers like Nitrate of Soda and Sulphate of Potash on the increased yield of latex, on which I had the pleasure of doing some preliminary work last year, and secondly the possibility of increasing the yield by selection, thus getting a jât of tree which gives a higher yield of rubber than that usually grown now.

With regard to other crops I will say nothing now except that I am delighted to hear that a trial is about to be made with Tea. I feel sure that Tea would do well in some parts of Coorg, and perhaps I may be allowed to here sound a note of warning. Tea cannot be planted cheaply; the best seed of a suitable jât must be obtained and it must be well planted and I strongly advise those of you who are contemplating growing this crop to get men with past experience of Tea planting to come and start it for you at first. I have seen utter failure as a result of the opposite system in a new district and I do not want to see that happen in Coorg. I believe it has happened once already.

In addition to the problems already touched upon you have your own special problems. There is the ghost like poochie which digs holes in the field when no man is looking, a mystery I hope the Assistant may be able to clear up and a ghost I hope he will successfully lay.

One of the special problems with which Coorg is concerned is the tendency of the Coffee branches in some districts to dry up with their leaves and crop. This is probably not a disease but due to physiological causes. I have been doing some work on the problem lately and I am inclined to think it can be solved by handling the soil moisture correctly. The water which the Coffee uses is that which remains in the soil after drainage held in the form of a film of moisture around each particle of earth. In good soils this capillary water, as it is called, amounts to about 30% of the weight of the soil, and after it has dried out to about 12% plants are unable to use it. During the dry season loss of water takes place by evaporation from the ground surface as well as through the leaves. The water in the soil tends to maintain an even balance, when a portion dries out water moves to it from a wetter place and when the roots withdraw water from their immediate neighbourhood more water carrying plantfood in solution moves towards them. The rapidity of this movement of capillary water depends upon the size of the soil particles and the proportion of fine to coarse particles.

The chief danger which results from an unsuitable physical condition of the soil is poor drainage and lack of sufficient oxygen in the soil. Such a state results in the weakening and even the death of roots. In a badly drained soil which during the monsoon becomes waterlogged many of the feeding roots are suffocated and this process of suffocation is a rapid one. Again a surface feeder like Coffee suffers from want of oxygen for the roots when the surface of the soil becomes baked hard in the dry weather. The Coffee under these conditions loses its vitality and readily becomes a prey to insect and fungoid diseases.

These considerations led me to examine the physical condition of one of the Coorg soils where the Coffee suffers annually from this drying phenomenon. In order to do this a mechanical analysis was made of the soil, that is an analysis by which the soil particles of various sizes are separated out and the amount of each weighed. Such an analysis is arbitrary of course, but the commonly adopted sizes and terms are as follows:—Particles larger than 3 millimeters in diameter are called Stones, particles with a diameter of 3 to 1 mms. are called Fine Gravel, particles with a diameter of 1 to 0·5 mm are called Coarse Sand, particles with a diameter of 0·5 to 0·25 mm are called Medium Sand, particles with a diameter of 0·25 to 0·1 mm are called Fine Sand, particles with a diameter of 0·1 to 0·5 mm are called Very Fine Sand, particles with a diameter of 0·05 to 0·005 mm are called Silt, and everything smaller than this is designated clay. (Specimens of these different constituents were exhibited).

Hall in his book on Soils points out that "the ease with which a soil allows rain to percolate depends upon the relatively low proportion of Silt and Clay rather than on the amount of coarse grained material; the fine particles pack in amongst the larger and the soil is equally resistant to the passage of water whether the finest material is diffused among coarse sand and gravel, or among the finer grades of sand. The shrinkage of a soil on drying, and its tenacity when dry are even more dependent on low proportions of course sand, humus and chalk than on the actual amount of clay and silt which cause the shrinkage. The really difficult soils to work are those containing less than 20% of sand above 0·1 mm. in diameter.

Now let us look at the mechanical analyses of three soils which I have made:—

	Good Coffee Leaf Discase.	Heavy bearing Coffee, Suffers from drying back.	Poor Coffee.
	1	2	3
Stones (Larger than 3 mms,) ...	0·3	0·1	1·3
Fine earth ...	99·7	99·9	98·7
	100·0	100·0	100·0
Moisture ...	3·3	3·6	6·7
Loss on Ignition ...	6·8	6·5	11·0
Calcium Carbonate ...	0·3	0·3	0·6
Fine Gravel (3 mm. to 1 mm.) ...	10·8	4·3	4·4
Coarse Sand (1 mm. to 0·5 mm)...	15·6	11·7	8·6
Medium Sand (0·5 mm. to 0·25 mm)	16·8	18·1	5·7
Fine Sand (0·25 mm. to 0·1 mm.)...	14·9	18·2	14·5
Very Fine Sand (0·1 mm. to 0·05 mm.)...	2·7	5·3	4·3
Silt (0·05 mm. to 0·005 mm.) ...	12·5	15·4	24·4
Clay (Less than 0·005 mm.) ...	14·6	15·6	18·1

It will be noticed that in all three soils the Calcium carbonate content is low. No. 1 contains 47% of sand as nearly 11% of fine gravel which makes it permeable to water and easily drained and worked while the silt and clay ensure a good capillary lift for the sub-soil water. The large proportion of sand however no doubt tends to make the soil fall together on drying and it probably dries out quickly to which the attack of leaf disease is due. The coffee grown on this soil is good as would be expected and presumably the leaf disease appers in the dry season. No. 2 contains much less fine gravel and about the same amount of sand as No, 1 but the proportion of silt and Clay is higher, In No. 3 this is still further apparent the sand content being only 28%. In the last soil the moisture content is higher as would be expected and it probably has a tendency to become wet and sticky in the monsoon and to dry out hard on the surface and crack. I am inclined to think that the drying back of the branches is due to this poor soil texture and its tendency to cake. Liming and draining will have a good effect upon such a soil and a certain amount of cultivation is needed. This does not mean deep digging, however, but I think that soils of the type of Nos. 2 and 3 will greatly benefit by having the surface broken up to depth of 3—4 inches twice in the year, first after the heavy monsoon is over, that is in November, which is also the best time to apply manures, especially Nitrogenous manures, and again before the blossom showers, in March. The average rainfall of the district from which these soils were taken is as follows:—

January	... 0·07	July	... 13·20	
February	... 0·28	August	... 10·21	
March	... 0·61	September	... 5·05	Total 70·10
April	... 2·51	October	... 6·84	
May	... 5·15	November	... 2·01	
June	... 23·49	December	... 0·76	

The dry weather light dig is the most important. By doing this an earth mulch is formed which prevents the rapid drying out of the soil and such a mulch to be effective need not be very deep, about 3 inches being quite enough. The top soil should be loose enough to absorb and give the full benefit of the blossom showers. After a long dry period when the soil has become very dry and hard if the first rains are light most of the water runs off the surface and is carried away in the drains and small showers are lost in this way not only because the water runs off but also because the small amount which is retained is held so near the surface that it is quickly lost. If, however, the soil has been lightly broken on the surface even light blossom showers will all be absorbed and produce their full effect upon the coffee.

These are suggestions merely and my intention is only to indicate a line of work. I think that this is one of the many things which might be taken up by the Scientific Assistant and advanced with advantage. It lends itself to experiment and I would suggest that the texture and moisture holding power of the Coorg, soils be studied together with the effect of Lime upon them and hot weather light digging not deep enough to cut the Coffee roots but sufficient to break up the top soil and establish a mulch and render the soil easily permeable to moisture. Probably not all types of Coorg soils need this treatment but it appears to me that soils in the neighbourhood of Santacoppa would benefit by it.

There is another point in relation to soil moisture which should be considered. It has been found in Victoria that Nitrification is inactive in soils where they contain about three times as much water as they possess in an average air dried condition. The best amount of water for Nitrification varies in different soils but ranges between 14 to 18% of the weight of dry soils and an increase of water above this optimum is as harmful as a decrease below it. Consequently if the working of the land in dry whether helps to keep the water in the surface soil this water may be very useful in the promotion of nitrification. The nitrate supply in the soil is reduced in two ways, by the consumption of the nitrates by plants and by the reduction of nitrification by bacteria due to the drying out of the soil. The relation of this to weeds and green dressings and the time of year that they should be removed from the soil having dried it enough is a line of research which I commend to your notiee and to that of the Scientific Assistant.

No doubt all this has a certain bearing also upon Leaf Dissase. Aeration is needed to promote oxidation and the formation of nitrates and yet not acidity. This is promoted by a large proportion of sand, clay soils tending to remain wet, unaerated, and acid. Hence the application of Lime reduces Leaf Disease, as also does an application of Nitrate of Soda at the rate of say 2 oz. per tree just before leaf disease usually appears. To reduce Leaf Disease, Lime your soils, in the dry weather, and later on follow this treatment with Nitrate of Soda, or if oxidation is rapid, organic manures such as fish, cattle manure, and Composts. These latter must be acted upon by bacteria before the Nitrogen in them becomes available as soluble nitrates and these bacteria will only work in the presence of air and a base like Lime to combine with the Nitric Acid formed.

Gentlemen, it is now my pleasant duty to formally present to you Mr. L. G. Jonas and to ask you to accord him a welcome. That you will extend to him that kindly hospitality and courtesy which you have always so generously extended to me I feel sure, and that you will get on well together I hope. You will find Mr. Jonas full of enthusiasm and if you take him into your confidence and work in close co-operation with him I feel quite certain that you will never repent having established a Scientific Department of your own in Coorg.

It is impossible for me to speak on this subject without a feeling of deep regret, which I know you share with me, that one of the first promotors of the scheme which we see consumated to-day in no longer with us. It was as I know very close to Mr. R. D. Tipping's heart, and he would have rejoiced to see it so rapidly and I trust suceessfully carried out in his own District.

In conclusion I wish you Mr. Jonas, and you Gentlemen the very best of good luck.

RUBBER SUPPLANTING COFFEE IN SUMATRA.

Baron Autenried and W. Imhelder, who are the managers of two English plantations in Sumatra, recently arrived in New York. They are making a trip around the world, and timed their arrival in New York so they could take in the Rubber Exhibition. Baron Autenried has been in Sumatra 20 years, and has been growing tobacco, coffee, rubber or cocoanuts all that time. He said to a representative of the New York *Times* :—

" The production of coffee is decreasing. It now amounts only to a catch crop, being interplanted with rubber trees. As soon as the latter grow up, the coffee plants can get no sun, and therefore do not thrive. Still the prices of the Sumatra eoffee that comes from our west coast are higher than Brazilian coffee. It has brought $21'50 a hundredweight. Most of it goes to London.

" Of course, everybody out there seems to be going in more are less for rubber. The first trees were planted in 1899, and then in 1903 the great estates, many of which had been devoted to coffee raising, began to plant rubber. A little later came the rubber boom, when a great deal of English capital came in, and much new land was opened."—*The Spice Mill*.

DISTRICT PLANTERS' ASSOCIATIONS.

Central Travancore Planters' Association.

Minutes of the Third Quarterly General Meeting of this Association held at Penhurst Bungalow, on the 26th October, 1912, at 10 a. m.

PRESENT,—Messrs. F. Bissett (Chairman), T. C. Forbes, (Vice-Chairman), J. A. Richardson, H. C. Westaway, J. H. Ellis, F. W. Winterbotham, F. E. Thomas, C. A. Mackenzie, R. St. George, W. A. J. Milner, G. L. Acworth and A. Slater, *Visitors*: and R. P. Roissier (Honorary Secretary).

The notice calling the meeting was then read.

The Proceedings of the last meeting were confirmed and taken as read.

The Chairman then welcomed Mr. Slater and also Mr. Acworth and said that the meeting would well remember that Mr. Acworth had been Honorary Secretary and Chairman of this Association and also Planting Member of Council.

Correspondence.—Read letters from the Superintendent of the Arnakal Grant in Aid Dispensary of the 6th August 30th August and 5th September. Read letter from D. McArthur, Esq., Manager in India Travancore Tea Estates Coy., Ltd., of 7th September. Read letter from the Durbar Physician of 6th September and 2nd October. Read letters from R. D. Anstead, Esq. of 17th September. Read letter from the Honorary Secretary, South Travancore Planters' Association of 6th September. Read letter from D. McArthur, Esq., Manager in India T. T. E. Coy., Ltd., of 6th August.

It was now resolved that the Honorary Secretary do write to all other Planting Associations in Travancore and ask them for their support in asking the Travancore Government to Legislate with regard to Estate Labour in Travancore only. There was a lengthy discussion on the question of Labour Legislation and Mr, Acworth was of the opinion that legislation was necessary and considered that we should be well advised to take Act I of 1903, several clauses of which he fully explained at the request of one or two members who wished for informatinn. The Chairman then thanked Mr. Acworth for the information he had given us.

Tea Thefts.—Read letter from the Superintendent of Police No. 2417 of the 16th October 1912, and the Honorary Secretary was instructed to write and thank the Superintendent of Police for his letter and for all the useful information contained therein.

Scheme of Registration.—Read letter from the Secretary, U.P.A,S.I., of the 8th October *re* the Scheme of Registration. The Honorary Secretary had previous to the meeting sent a copy of this Scheme to each member of the Association. The Honorary Secretary was instucted to write to the Secrethry, U.P.A,S.I., saying that we approve of the Scheme and that any suggestions will be offered later.

Bangalore Delegate's Report.—Mr. Chairman and Gentlemen,—I attended the U.P.A.S.I. Annual Meeting as your delegate. I will take the items of interest to this Association in the rotation in which they were discussed.

The Meeting lasted four days and opened with the Secretary's Report for the year. The Chairman's address then followed and the Scientific Officer's Report. All these have been printed in the *Planters' Chronicle* so I need not touch on them but would call yonr attention to the interesting report of the Scientific Officer.

Weights and Measures.—The Kanan Devan Planters' Association's delegate proposed a resolution which was carried unanimously asking that the Government of India be approaehed (through the Government of Madras) Mysore, Travancore, and Cochin that further steps be taken towards the general standardisation of all weights aod measures in India. As no doubt you are aware this matter was brought up in 1910 when a similar resolution was proposed and carried and again in 1911 but no reply has been received from the Government of India. The Government of Mysore is bringing in an Act to standardize weights and measures so it is hoped that their good example will be followed by the other Native States and the rest of India.

Roads and Communications.—The Kanan Devan Association's delegate brought up the subject again of the Vagai Railway better known to us as the Cumbum one and proposed the following resolution:—"That this Association endorses the opinion of the Chamber of Commerce of Karachi and considers that the action of the Secretary of State is entirely contrary to the best interest of India and that the money at present invested at ridiculously small interest at Home could be much better utilized for the construction of light Railways and communication roads which are urgently needed in the interests of the community generally and suggested that in the event of Government being unable to immediately finance the proposed schemes they withdraw all opposition to private enterprise." In proposing this he mentioned that so far when Government were approached for help they had been met with the reply that it was difficult to get money for this purpose. It was hard to understand how this couid be as it is stated that the Secretary of State for India had £18 million sterling lent out to favoured Capitalists at 2½ to 3%. The K. D. P. A. had offered to guarantee this Railway scheme, but they were referred to the S. I. R., and the Madura District Board. The Government of India have practically given the concession to the S. I. R. and they have placed it fifth on their programme of construction so it appears as far off as ever. The following Associations voted in favour of it:—Mundakayam, Central Travancore, Anamalais, Kanan Devan, Shevaroys and Nilgiris, the rest refraining.

Finance.—You will have seen the balance sheet for last year showing a credit balauce of Rs.567-9-6, to which has to be added Rs.1.595-0-0 for subscriptions which had been omitted. The estimated revenue for 1912-1913 is Rs.18,067-5-1 including the above balance, and the expenditure Rs.13,569-7-1 which will leave a balance of Rs.4,497-14-0 to the good.

Planters' Benevolent Fund.—It was decided to keep this quite separate from Association's account in the Bank of Madras, and to avoid any possibility of its getting mixed up. The investements and funds will in future be kept in the Mercantile Bank of India and cheques drawn upon the fund will reqnire the signature of the Chairman and Secretary of the U. P. A. S. I.

Planters' Chronicle.—It was decided to continue this as a weekly paper.

India Tea Cess.—The Association was in favour of renewing this for another period of five years. The Hon'ble Mr. Jackson gave some very interesting figures showing how that from 1894 when the voluntary Cess was started, the amount collected was £3,811 and the amount of Indian Tea exported was 129 million lbs. This went on till 1902 when the amount collected was £3,829, and the export of tea had risen to 181 million lbs. In 1903 the compulsory act was passed, and the amount collected that year was £17,861 and in 1910 £22,088, the exports of Indian tea rose from 181 million lbs. to 256 million lbs. in seven years, so these figures speak for themselves.

Pest Act.—The Indian Government have appointed a very strong committee to go into the matter, but before any local act can be brought in, it is necessary to have general legislation first. That is how the matter stands at present.

Fertilisers.—Mr. Anstead gave us a very interesting lecture on these which has been published in the *Planters' Chronicle*, so I need not touch on them.

Export Duty on Bones.—There was a long discussion on this subject, and it was proposed and carried unanimously that a small committee should be appointed to go into the matter, and submit a report before the next meeting. It was pointed out by Mr. Anstsad who was the U. P. A. S. I. delegate at the Board of Agriculturists conference, that this question was then brought up. When the figures for the whols of India were considered they were so large, that those quoted for Madras were absurd. The balance of bones available for exportation was ten times as much as that consumed locally. He was then asked if an export duty was levied on bones, would the Planters of South India take the balance? The balance came to something enormous. He of course said "No" and was then asked why they wanted to interfere with an established trade? They took the figures for the whole of India, and for every million we quote they quote 40. There is therefore very little hope of Government considering the question of an export tax.

International Rubber Exhibition.—As requested I protested against the refund of the subscriptions, which has been given for this purpose. It was pointed out to me by the Chairman, that when the accounts were rendered, the Secretary had written and asked what was to be done with the balance of the fund? After the correspondence came in, somewhere about the end of October, a circular was sent out asking whether any of the Rubber Associations wished to support the New York Rubber Exhibition. The Secretary received no replies. When Mr. Richardson came out from England, another circular was sent proposing that a general exhibit to cover all the products of South India should be sent, and this again received very little support. The matter was then allowed to drop. As they had no right to use funds for any other purpose than that for which it was granted, the Planting Member of Council then went into the matter, and asked the Chief Secretary to the Governmens of Madras what he would like done, That official said that they would take back the money if refunded. Mr. Hamilton strongly advised ihe repayment *pro rata* to ali subscribers, and this was done.

Importation of Tobacco into Travancore.—I brought up this subject and proposed the following resolution:—

"That this Association do approach the Government of Madras with a view to tobacco being allowed to be imported by post into Travancore and Cochin and also to approach the Trades Association of Madras and obtain their support." Mr. Plowden seconded this, and it was carried.

The Kanan Devan Delegate supported this resolution and there is every hope that we shall be granted this concession.

Labour.—Mr. Hamilton drew the Association's attention to the fact that the Government of Zanzibar were recruiting labour to work on the Cocoanut gardens through the Government of India. The Madras Government had been approached on the subject by the recruiting officer but as they took no particular notice of the application, the recruiting officer went straight to the Government of India, who not only gave him permission to recruit in Northern India, but also approached the Government of Madras, and induced them to give a free hand in Southern India. So far as is known a good many Sikhs and Moplahs have been recruited. It was also pointed out by the Kanan Devan Delegate, that as the facilities granted by the Federated Malay States to recruits was a guarantee of all expenses from the time of engagement to arrival on the Estates, a resolution was passed that the Government of India should be approached through the Government of Madras with a view to getting an explanation of the position they are taking up as regards the emigration of labour for Governments outside India.

Registration Scheme.—The circular in connection with this has already been distributed with a view to an expression of general opinion. A committee was appointed to receive the opinions of the various Associations and if necessary to harmonise them and circulate a working scheme before the next Annual Meeting.

Voting qualifications.—The rule as regards this was altered, and now reads as follows:—

"That every District Association be assessed at the rate of 8 pies per acre on the area under cultivation, represented by members of the Association. That a vote shall be given for every Rs. 10 subscribed."

In conclusion, gentlemen, I must thank you very much for the honour you did me in electing me your delegate.

The Chairman proposed a vote of thanks to Mr. Westaway.—(Carried with applause.)

Sri Mullam Delegate.—It was proposed by the Chairman that Mr. Westaway be asked to represent this Association at the forthcoming Sri Mullam Assembly. Seconded by Mr. Richardson and carried unanimously. Mr. Westaway then thanked the members for electing him as their Delegate. It was resolved that the Committee instruct the Delegate at a later date.

Finance.—It was resolved that a further call of 1½ anna per acre be made on this year's subscription to meet expenditure.

Read letter from the Secretary, U. P. A. S. I. of the 27th September. Proposed by Mr. Westaway:—"That this Association fall into line with the majority of Associations belonging to the U.P.A.S.I. and pay 2 annas per acre subscription but protest against the voluntary subscription ranging from 8 pies to 2 annas as it does away with the resolution unanimously carried in 1910 placing all subscriptions on a uniform basis." Seconded by Mr. Richardson and carried unanimously. It was resolved that the Honorary Secretary send a copy of this resolution to the Secretary U.P.A.S.I, and also to the Honorary Secretaries of the Kanan Devan, Malabar and Mundakayam Associations.

Motor Transport.—This was referred to the Motor Transport Committee and it was resolved that the Committee attended the meeting of the Mundakayam Rubber Planters' Association on the 2nd November with a view of discussing this Scheme with the Mundakayam Committee.—Carried.

Labour Rates.—These as drawn up by the Labour Rate Committee were circulated in the room and the discussion on these rates was postponed till after the next Committee meeting.

Arrack Taverns.—It was resolved that the Honorary Secretary write to the Excise Commissioner and ask for the removal of the Arrack Tavern at Kottikanam.—Carried.

Mr. Richardson proposed that as Mr. Leahy, Ex-Chairman of this Association, and who is now in England, is getting married on the 30th October, a cable be sent to him sending the congratulations of this Association. Seconded by Mr. Westaway and carried with applause.

With a vote of thanks to the Chair the Meeting terminated.

(Sd.) REGINALD P. ROISSIER, *Hon. Secretary.*

CORRESPONDENCE.

Srivilliputtur,
Ramnad District, S. I.,
2nd November, 1912.

To

The Editor,
Planters' Chronicle,
25, South Parade, Bangalore.

Dear Sir,—If you have not already published these figures, they may interest your readers.

Yours faithfully,
(Signed) AYLMER Ff. MARTIN.

The number of persons born in South India and enumerated in Ceylon during the 1911 Census is as follows:—

Trichinopoly	...	102,317	of whom	92,929	are engaged on Estates.
Madura	...	82,105	,,	62,351	,, ,,
Tanjore	...	60,119	,,	48,237	,, ,,
Salem	...	39,250	,,	34,967	,, ,,
Tinnevelly	...	70,391	,,	31.484	,, ,,
Pudukotah	...	17,896	,,	15,871	,, ,,
North Arcot	...	17,321	,,	15,692	,, ,,
South Arcot	...	13,098	,,	11.867	,, ,,
Coimbatore	...	9,273	,,	8,256	,, ,,
Mysore	...	8,189	,,	6.506	,, ,,
Madras	...	10,689	,,	6,294	,, ,,
Chingleput	...	6,603	,,	6.218	,, ,,
Travancore	...	6,868	,,	4,984	,, ,,
Malabar	...	11,734	,,	3,636	,, ,,
Krishna	...	1,571	,,	1,382	,, ,,

Anantapur, Bellary, Cochin, Cuddapah, Ganjam, Godaveri, Kurnool, Nellore, Nilgiris, South Canara, and Vizagapatam give less than 1,000 each.

There are only 679 persons born in South Canara, living in Ceylon, of whom 637 work on estates. A look at the Map will show that the eastern half of the Peninsula south of the latitude of Madras supplies Ceylon estates with the vast majority of their labour, about 300,000 persons out of a total of about 360,000

The figures are taken from the Estate Statistics of the Census of Ceylon 1911 by E. B. Denham (of The Ceylon Civil Service).

(Signed) A. Ff. MARTIN,

The Planters' Stores and Agency Co., Ltd., Agents for Messrs. Davidson and Co., Ltd., of "Sirocco fame." have received a cable this week from Belfast, announcing that the price of all "Sirocca" Tea Machinery will be increased 5 per cent., the increase to take place on and from the 1st November next. We understand this increase is due to the enhanced rates for raw materials, extra cost of skilled labour, and a general increase in the cost of manufacture in all departments.—*Capital.*

TEA.

INDIAN TEA.—The dearer tone which prevailed last week was well maintained at Monday's auctions, when all descriptions were well competed for. At Wednesday's sale the stronger feeling was even more accentuated, and a further advance took place. Useful medium descriptions among both Broken Pekoes and leaf kinds were in good demand, and the better liquoring sorts were more difficult to buy. Tippy Teas also were steadily supported, but were in many instances inferior in colour and appearance to recent offerings. The India Tea Association's telegram of October 4th reports generally unfavourable weather conditions and a poor out-turn from the Cachar and western Dooars districts. Other out-turns have been normal, with only fair prospects in Assam. The following are the figures in September:—Imports, 27,22,000 lbs. against 26,795,000 lbs. Deliveries, 14,063,000 lbs. against 14.604,000 lbs.; while the stock stands at 48,779,000 lbs. as compared with 40,355,000 at the corresponding period in 1911.

CEYLON TEA.—There was a further falling off in the quantity offered at the auctions on Tuesday, and, with an active demand, the market was dearer. The lowest grades of whole leaf, which have until recently been quite neglected may be quoted ¼*d.* per lb. higher, while the better liquoring Pekoes and Orange Pekoes frequently showed an advance of ½*d.* to 1*d.* Broken Pekoes up to about 7*d.* were very firm, and above that figure mostly ¼*d.* to ½*d.* dearer, the finest descriptions showing a still greater rise. At the public sales 22,383 packages were brought forward, nearly all of which were sold.

CHINA TEA.—Very attractive value is now offered in fair liquoring Monings from 5½*d.* to 7*d.*, and a considerable quantity has been sold. Merchants have been willing to meet the market and accept lower prices, and the effect has been that Kintucks from 9*d.* to 1*s.* 1*d.* have received more attention from the trade. The demand, however, is not very general, although present prices are likely to induce buyers to secure stocks while these cheap Teas are available.

LONDON TEA RETURNS.

	Duty Paid.		Export	
	1911.	1912.	1911.	1912.
	lbs.	lbs.	lbs.	lbs.
For week ended October 5th ...	5,968,101	5,690,141	912,406	1,183,358
For 40 weeks ended October 5th ...	199,718,884	198,783,559	35,417,770	35,021,019

OFFICIAL STATISTICS OF THE TEA TRADE OF THE UNITED KINGDOM.

	One Month ended September, 30th.		
	1910.	1911.	1912.
Imports—	lbs.	lbs.	lbs.
India ...	24,460,260	28,501,467	26,688,491
Ceylon ...	6.872,432	8,082,379	8,747,225
China ...	2,518,065	4,986,278	2,851,230
Other countries ...	2,318,146	2,072,433	3.002,326
Total imports...	36,198,903	43,642,557	41,290,272
Home consp. ...	24,274,425	25,090,971	23,890,608
Exports ...	4,116,704	4,534,886	4,735,647
Total deliveries...	28,391,129	29,625,857	28,626,255
Stock on Sept. 30th. ..	97,621,000	89,823,000	109,836,000

OFFICIAL STATISTICS OF THE TEA TRADE OF THE UNITED KINGDOM.

	Nine Months ended September 30th.		
	1910. lbs.	1911. lbs.	1912. lbs.
Imports—			
India ...	95,331,202	96,531,140	102,967,515
Ceylon ...	86,425,416	82,994,873	90,310,334
China ...	13,383,380	17,641,340	16,038,947
Other countries ...	19,036,071	20,503,347	28,580,908
Total imports...	214,176,069	217,670,700	235,897,704
Home consp. ...	212,504,341	216,467,088	217,439,319
Exports ...	35,050,760	34,900,176	34,816,245
Total deliveries...	247,555,101	251,367,264	252,255,564
Stock on Sept. 30th. ...	...	...	...

—*The Produce Market's Review.*

To Hanwella Estate belongs the distinction of being the first to turn out Ceylon hard fine Pará. Mr. H. A. Wickham, who contends that the difference between Brazilian hard fine Pará and plantation rubber is only a matter of treatment, has given a demonstration on the estate, and the results have turned out quite satisfactory, and are to be seen in the premises of the Colombo Commercial Company in Slave Island. The rubber has been turned out in the shape of blocks, and is believed to be equal in every respect to fine hard Pará, consisting as Mr. Wickham says, not of a curd or coagulation from latex but of an amalgam of the whole of the latex with the preservative smoke. The opinion of the market on the rubber will be awaited with interest. Mr. Wickham says that he found plantation latex, if anything, richer than that produced on the Amazon, and, similarly treated, ought to form superior not inferior rubber.—*Commerce.*

At Tuesday's Colombo tea sale the demand was moderate. Light liquoring Brokens were irregular and weaker. Good medium Brokens and Orange Pekoes remained firm at last week's rates, while Pekoes showed some advance. Common kinds ruled firm, and commonest were in rather better demand. Dusts and Fannings continued strong. Selection fair, but with declining quality. Total quantities dealt with:—Black tea, offered 1,418,948 lbs.; sold 1,161,172 lbs.; compared with 1,396,048 lbs. and 1,255,342 lbs. last year. Green tea offered 30,947 lbs.; sold 17398 lbs.; compared with 49,455 lbs. and 445,970 lbs.—*Commerce.*

COFFEE.

This month is nearly always a critical time in Brazil. Following what is reported to have been a poor September flowering, a satisfactory October would alter the position, but further unfavourable flowering would almost assuredly point to another small crop. It is well, however, to bear in mind that the record crop was grown when all reports from Brazil up to the beginning of November were much the same as this year, stating that frost had destroyed young trees and drought was adversely affecting the older ones. With good ordinary Santos fetching 75*s*., it is only natural that grocers all the world over will not buy more than is needed for their immediate wants, the margin for a fall being so much more than for a further rise. Other Coffees have been in small supply and have sold well at rates favouring importers rather than the buyer. Rather more enquiry has been noticeable for East India, and its relative cheapness is becoming more apparent. A small sale of Costa Rica on Thursday contained two marks which were said to be from the new crop, and gave evidence, by the smallness of the berry, that the drought there has been very severe.

LONDON COFFEE RETURNS.

	Home Consumption.		Export.		Stock.	
	1912 Tons.	1911 Tons.	1912 Tons.	1911 Tons.	1912 Tons.	1911 Tons.
For week ended October 5th ...	295	371	576	602	12,452	13,216
For 40 weeks ended October 5th ...	12,855	11,701	12,682	26,169	...	...

OFFICIAL STATISTICS OF THE COFFEE TRADE OF THE UNITED KINGDOM.

	One month ended September 30th.		
	1910. Cwts.	1911. Cwts.	1912. Cwts.
Imports ...	32,654	59,369	40,303
Home Consumption ...	22,546	22,148	19,864
Exports ...	78,571	40,918	33,660
Total deliveries...	101,117	63,066	53,524
Stock on September 30th ...	526,000	291,000	262,000

	Nine months ended September 30th.		
	1910. Cwts.	1911. Cwts.	1912. Cwts.
Imports ...	792,132	632,116	567,551
Home Consumption ...	202,614	198,300	197,381
Exports ...	595,084	568,109	319,173
Total deliveries...	797,698	766,409	516,554
Stock on September 30 ...	...	...	...

—*The Produce Markets' Review*.

RUBBER.

The Manuring of Rubber Estates.

In recent issues we have given the views of planters and directors on the subject of thinning-out Hevea estates, believing that the treatment of closely planted areas is one of the most difficult problems before cultivators. Next in point of importance is the subject of manuring. It has been argued that *Hevea brasiliensis* is such a hardy tree and greedy feeder that it will flourish even among rocks, and expenditure on manuring need not therefore be considered. It is certainly surprising to find this premier rubber tree giving such satisfactory returns in countries and districts in each country where soil and climate factors exhibit marked differences. Hill-sides, flat plains, drained swamps, volcanic soils, gravelly and stony terraces, and other types of land appear to provide sufficient nutrition for the rapid and continuous growth of Hevea trees. It is not to be wondered at that manurial operations have not even been considered by owners of trees planted on some of the rich alluvial soils of Malaya, or the volcanic soils of Sumatra and Java. But even in these instances, we believe, the question will have to be seriously handled when crops are dependent upon secondary, tertiary and subsequent bark.

MANURING OTHER TROPICAL PRODUCTS.

A very instructive lesson can be learnt from the experience of planters dealing with other products in countries where rubber trees are also grown. Probably the best example is furnished by the tea-planting industry in India, Ceylon and Java. There are many estates which have raised their output per acre, per annum, from 300 to over 600 lbs. by the application of manures at regular intervals. The effect of separate and mixed manures has been determined on so many types of soil that it is comparatively easy to raise the yield by definite increments of 50 lbs. per acre by selecting certain manures and applying a specified quantity to the soil at definite intervals. There is probably no tropical industry which is so dependent on the application of manure as tea is to-day, and it is questionable whether many estates could show a reasonable profit if manuring was entirely dropped.

It may, quite reasonably, be argued that the results obtainable with a leaf product such as tea are no guide to those which might accrue from the same treatment of rubber. But it can be shown that manuring has a beneficial effect not only on leaf, but on fruit and bark products. The effect of manures on fruit crops—coooanuts, cacao and coffee—is not always so obvious as in the case of tea, but it is now common knowledge that judicious manuring does increase the crop, and in many instances is absolutely necessary. Cacao in Ceylon and the West Indies would occupy a poor position without the adoption of good cultivation and manurial operations. The high yields now obtained from cacao trees in Samoa and San Thome show the value of a good supply of food in naturally rich soils, and compare very favourably with the smaller annual crops from Ceylon estates on poor soil.

EFFECT OF FOREST VEGETATION.

Unlike tea, cocoanuts, coffee, and even cacao, rubber plants grow into trees of enormous size, and themselver form a dense forest, As remarked elsewhere the soil under forest vegetation of any type improves "in mechanical and chemical composition with age, owing to the protection which the trees afford to the soil, to the action of the roots, and the accumulation of leaf-mould. The annual fall of leaf from Hevea rubber trees ultimately effects an improvement in the soil in which the trees are being grown. This is borne out by the analyses of the soils at Henaratgoda, the results proving that the organic matter, potash, and nitrogen are greater in the soil which has been under rubber for twenty-nine years than that maintained under pasture; the lime and magnesia have decreased under the old rubber, while the phosphoric acid is the same under both conditions."

But these improvements do not justify any proprietor in declining to assist nature, and to supply still more good to the growing tapped trees.

Effect of Tillage on Hevea.

Where the soil is naturally very rich, it is granted that the turning over of the soil by forking or chankolling, will have as great an effect as the actual application of manures on other soils. It must also be admitted that there are also many estates where the soil is so rocky or stony as to render forking almost impossible, and where cultivation is therefore necessarily limited to the application of more or less readily soluble manures.

In tillage operations several points have to be borne in mind. In the first case it must be remembered that the destruction of Hevea roots may increase the amount of dead organic matter in contact with living roots, and therefore considerably increase the risks from diseases in this and other ways. It is quite clear that if root destruction is unavoidable the roots must be cleanly cut and not torn; the depth to which different soils need tilling will determine whether that operation can be best done by forking or chankolling.

Effect of Manures on Hevea.

It might be imagined, if we are to accept the dictum that latex is mainly an excretory or useless product, that manuring would have no beneficial effect. But even if it were a waste product, manuring would, since it increases the rate of growth of all parts, affect the chemical changes going on within the plant, and with the increased activity in living parts there would be a corresponding increase of waste products.

Manuring of rubber trees is, however, on quite another basis. The application of manure is followed by a more rapid growth of all parts of the plant, the bark included. Now the "bark is the mother of rubber." The greater the weight of bark the larger the number of latex tubes, and therefore the greater the weight of rubber. You cannot have the bark of healthy *Hevea brasiliensis*, *Manihot Glaziovii*, *Castilloa elastica*, *Ficus elastica* or *Funtumia elastica* trees, without latex. Latex is present in the bark of healthy trees, and if removed from any particular part it soon accumulates, until approximately the old equilibrium is reestablished in the affected area. If more bark is formed as the result of manuring, it will assuredly become filled with latex like the renewed bark which takes the place of that removed during paring operations.

Necessity of Manuring.

It being taken for granted that manuring does stimulate the growth of the plant, and that a total increase in plant tissues means an increase in the rubber content, it now remains to prove that an increased rate of growth is desirable. It is asserted by many that there is a maximum rate of growth in all plants which it is not desirable to exceed. It is common knowledge that manures can "force" plants, and that the resulting specimens may be really weak and unable to stand well against the ordinary variations of environment or the attacks of pests and diseases. I have even heard the view expressed that each species has a life of its own which it is impossible to really lengthen, and that forcing of growth means a shortening of the life of any specified plant.

Given a widely-planted Hevea estate in fair health on good soil, there is certainly no urgent need for manures of the artificial or readily soluble type in the early stages. But we doubt whether even on our best estates there is that uniformity which would obviate the necessity for special attention to individual trees. The best of estates always possess several trees, on every acre, which are backward in growth on account of local poorness of soil or feebleness of the plants; supplies alone are invariably responsible for irregularities in growth over a considerable acreage. In all such cases we would advocate the use of manures.

There is, when we view the rubber planting industry in its widest sense, no doubt as to the necessity of manuring and tillage. Estates have been planted on poor soil, at high altitudes, and in uncongenial climates; others have been planted at close distances, and after thinning-out the remaining trees present a backward appearance. Numerous estates are not able to tap the renewed bark because it has not grown so rapidly as was expected, and monkey tapping, V tapping on restricted areas, and other methods have been resorted to. There would be no difficulty in quoting a large number of estates possessing trees which badly require either a good rest or extra food to stimulate the rate of growth.

EXPERIMENTS BADLY NEEDED.

Those proprietors who admit the necessity of manure are sometimes ore ly perplexed, because there is very little information of a reliable character respecting the components and quantities of the different ingredients which should be applied. It is true that experiments have been made in Hawaii, Sumatra, Ceylon, Malaya, but in no case can we confidently accept the results for general guidance.

We do not see why the agricultural departments in Ceylon, Kuala Lumpur, and Singapore, should not commence a definite series of experiments with the object of determining the effect of various manures on trees of different ages. Very valuable work has been done on these lines by the tea planters of Ceylon and India, and the results have been largely acted upon in those countries. Such experiments would have a special value for those countries where the soil is admittedly deficient in plant food, and where proprietors of close-planted estates are working in the belief that such properties can, with manure, permanently carry considerably over 100 trees per acre.—*The India Rubber Journal.*

MANIPULATION OF "JAVA" COFFEE.

(From Consul Frank W. Mahin, Amsterdam, Netherlands).

In response to an inquiry from the Department of Agriculture at Washington I have investigated the reports that an impure Java coffee is being exported from here to the United States. It is stated that owing to keen competition a secret practice of "manipulating" Java coffee has grown up, such coffee being exported largely to South Africa and some to the United States. The process is merely selecting good-sized Santos beans, putting them through a little machine, and polishing and painting them to give them the colour and appearance of the real Java. This is known in the trade as "manipulated Java," which may be wholly or partly made up of inferior kinds. For shipments to the United States it is inferred that the article consists of a mixture of real Java with inferior beans. Outside the trade the coffee is known as Java.—*The Spice Mill.*

The Planters' Chronicle.

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THE U. P. A. S. I.

(INCORPORATED.)

DISTRICT PLANTERS' ASSOCIATIONS.

Wynaad Planters' Association.

Proceedings of a General Meeting held at the Meppadi Club, on November 6th, 1912.

PRESENT.—Messrs. Egan, Gillatt, J. C, C. Parker, G. R. C. Parker, Powell, Vernede and C. E. Abbott, (Honorary Secretary.) *Visitors*: Mr. Cammeade, Divisional Magistrate, Doctor Milton, and Mr. Briggs,

Mr. J. Carson Parker in the chair.

1801. *The Proceedings of last Meeting.*—These were confirmed.

1802. *The Proposed Grant to Meppadi Club.*—The Proceedings of a General Meeting of the Meppadi Club held on October 2nd, 1912, were laid before the Meeting. Proposed by Mr. Egan, seconded by Mr. Vernede, and carried unanimously, "That a grant of Rs.1,000 be made to the Meppadi Club from the funds of the Association for the purpose of carrying out the suggested improvements."

1803. *Grant to Meppadi Church.*—Proposed by Mr. Gillatt seconded by Mr. Egan and carried unanimously: "That a grant up to Rs.250 be paid from the funds of the Association derived from the sale of the "Westward Ho" Bungalow for the repairs of this Church."

1804. *Rules of the Association.*—Resolved: "That Rules 5, 7 and 18 be altered to suit the resolutions passed on October 12th, 1910 aud January 14th, 1912, and that the Committee report to the Annual General Meeting in January."

1805. *Mr. Marden's Registration Scheme.*—After considerable discussion the following resolution was passed unanimously: "That this Meeting is unable as yet to commit absent Proprietors to the expenditure proposed by this scheme; but urges the Planting Member to ascertain the views of Government on the subject, as it fully recognises that the labour problem must be faced, and some remedy found for our difficulties."

1806. *Post Office at Perrendotty.*—Read correspondence; the Post Master-General states that under the rules of the Department he is unable to refund the money paid as a guarantee even if the Post Office pays its way. Resolved: "That this Meeting instructs the Honorary Secretary to write to the Postmaster-General expressing its regret at his decision, and inquiring what the new rule is: as in the case of post offices opened in other planting districts. *e.g.*, at Ranee and Mundakayam, only a conditional guarantee against loss was demanded."

1807. *Remission of Assessment.*—The following extract from G. O. 2644 Revenue dated September 3rd., 1912, was read and is printed for information:—

" In the Wynaad Taluk of the Malabar District, plantations of pepper, coffee, tea, cinchona, rubber or other special products newly made on land taken up under these rules or on land already under occupation will be exempt from assessment for three complete years. The question as to what products shall be deemed to be 'special' for the purpose of this rule is a matter entirely within the discretion of Government."

1808. *Roads.*—Read letter from Assistant Engineer about Vellera Mulla Bridge. The Honorary Secretary was instructed to ask that the work of reconstruction be pushed on as rapidly as possible.

1809. *Warrants.*—Read correspondence between Mr. Powell and the Vayitri Magistrate regarding the refusal to grant a Maistry a hand warrant, and the great delay that takes place in issuing warrants, copies of which have been sent to the Divisional Magistrate.

A vote of thanks to the Chair terminated the Proceedings,

(Signed) J. CARSON PARKER, *Chairman.*
(„) C. E. ABBOTT, *Hon. Secretary.*

Coorg Planters' Association.

A Meeting of the Coorg Planters' Association was held at Mercara on 14th November to welcome Mr. L. G. Jonas, the recently appointed Scientific Assistant for Coorg. The Scientific Officer, Mr. R. D. Anstead, who came up with Mr. Jonas formally introduced the latter, and his address was printed in the *Chronicle*.

Mr. Jonas exhibited a number of samples of Coffee which he had obtained from the brokers in England and brought out with him. These showed the different grades which find favour on the market. In explaining these samples Mr. Jonas said :—

" I was able to get a few samples of Coffees from different parts of the world. The Scientific Department has reserved some of each sample for for record and analysis. The rest is here for your inspection. I hope that these will form the nucleus of a larger collection than this, as I am in communication with Messrs. Travers & Co., of Cannon St., London, who are Coffee merchants of considerable esteem, and their buyer has promised to frequently send me samples of any coffees, other than Coorgs, that may be fetching any particular prices in the English market, and which have any other peculiarity in value, so that we may compare them with our own Coorg varieties.

" I am also trying to get samples and methods of tasting, etc., from some Continental firms.

" I find that it is often asserted by many coffee planters that there is considerable prejudice shown in the markets for certain brands and estate marks, so that I endeavoured to find out, while in London, the data on which merchats base their judgments when buying for the English markets.

" The brokers do not taste at all. They judge partly by sight, and partly by the demand of the wholesale merchants for particular brands.

" The merchants do a certain amount of tasting but they are not over-keen to give away the methods, which they adopt; however, I will endeavour to give you a short resume of the method practieed by a London wholesale merchant.

" I may class their tests under two headings :—

i. Judgment by sight and weight.
ii. Judgment by tasting.

"i. *Judgment by sight and weight.*—A large, bold berry is preferred, of a bluish green colour.

" Then handfuls of the different samples are taken, and the buyers can tell to a nicety from their long experience, the comparative weights of the bulk which these samples represent.

" The weights of all the samples which I have here, are the same, so that you can gain an idea of their comparative bulk.

" While on this subject I should like to refer to that word 'bold' that I have just used.

" Now I think that 'Maragojipe' may be taken as a fair idea of what I mean by bold.

" I have been told by several buyers that there is really nothing very specially attractive in 'Maragojipe' as regards taste, but that consumers insist on having a large berry, the idea in their minds being that 'in order to be good, it *must* be large.'

"ii. *Method of Tasting.*—Equal weights of each sample are roasted for half an hour, A sampling cup which should contain about 100cc. of water when full is placed on one pan of a balance and is counter-poised by an equal weight in the other pan. The roasted sample is then ground straight into the cup, the weight taken, being equal to that of a new English penny. I may state an actual weight as being 10 grams. The rest of the samples are treated in exactly the same way until there are, say, 10 cups in a row, each with its 10 grams of ooffee and a spoon.

" Then water, which has been boiling for about 1 minute is poured into each cup, until it is about three quarters full, The contents of the cups are then well stirred with their respective spoons, to ensure the proper infusion of the coffee, filled up to a mark on each cup, and left to stand for about three minutes. During these 3 minutes a scum forms on the top of the liquor which is skimmed off.

" At the end of the three minutes the grounds will have quite settled, and also the coffee will have become cool enough to taste.

" The actual tasting is done by using a flattened dessert spoon, taking a spoonful from near the top of each cup, so as to avoid disturbing the grounds.

" The tasting spoon being well washed after each taste. The undesirable coffees are at once eliminated, then those that are 'fair,' and lastly the one that the taster considers best. The infusion must have an acid flavour, and it must also be a 'round' one—but this is almost impossible to describe in words.

" I am given to understand that the Coffee planters in South India are particularly interested in the so-called deterioration of the quality of their coffee, and that it has been suggested that work might be undertaken to investigate the matter, and I hope, therefore. that some of us will be able to meet together to discuss the question of the quality and curing of coffee, and study tasting methods with the object of working out some system by which we can test coffee in this country before shipment on parallel lines to those usually adopted by buyers in the European market."

After a few words of welcome from the President, Mr. Murray-Aynsley, the Meeting was formally closed, and a most interesting discussion took place on the samples exhibited and the subjects raised by the officers of the Scientific Department.

RUBBER.

Rubber Conference at New York.

The third International Rubber Exposition was opened at the Grand Central Palace by an address delivered by the Dock Commissioner, Calvin Tomkins, who welcomed the delegates of foreign governments on behalf of Mayor Gaynor. He called attention to the fact that ever since the rubber industry began to develop with the discovery of vulcanization, America had become the principal user and manufacturer of that commodity. At the present time, said the Commissioner, the United States uses more than half the total production of the world's raw rubber.

Delegates to the rubber Conference will begin their sessions to-day when scientific papers will be read. Henry C. Pearson, of New York, is to preside, and lectures are to be delivered by Arthur W. Stedman, New York; Cyril E. S. Baxendale, Ceylon; Dr. Santiago Cardwell-Quinn, Brazil; Charles P. Foz, Akron, Ohio; Francis E. Lloyd, Montreal; P. L. Wormley, Bureau of Standards, Washington; D. C. Jurgensen, President of the Institute of Operating Chemists; L. E. Weber, Boston, and others.

Commissioner Tomkin's address was, in part, as follows:—

"I congratulate you on the comprehensive educational value of your exhibition It is of more than mere technical and trade interest that knowledge concerning this great staple industry should be popularly disseminated. Most of the great staples are in part used where they are made and people consequently know about them. The authoritative statement was made at the International Chemical Congress, just adjourned, that before long this might be true of rubber also. Whether, as was the case with the ancient madder and indigo culture, the processes of nature will be superseded by laboratory and factory processes or to what extent nature shall be assisted are interesting and not barren speculations.

"All the world is expectantly awaiting the great chemical and physical advances in knowledge which scientists of the highest accredited reputation assure us are impending. This expectant attitude is especially characteristic of the rubber industry at this time. Possibly rubber may be made. Probably the culture of rubber plants will be extended in plantations and protected in the wilderness. Certainly improvements in culture and improvements in processes will advance the art, and great international fairs, such as this, by bringing together the men and products of the industry will, through the free interchange of contemporary thought, admirably serve the interests of our rapidly advancing civilization.

"In this great and representative exhibition two things especially will strike most people—first the fine machinery (mainly American) which is employed either in treating the rubcer in its earliest and crudest stages, or in utilizing it in its finished forms for all sorts of purposes from hose to overshoes, from tyres for automobiles to toys for the nursery, from deep sea cables to flooring, such as that over which we walked as we entered this exhibition; the second striking thing is the rivalry—a perfectly friendly but nevertheless a very serious rivalry—which exists for premier position in the markets between what is called wild rubber and plantation or cultivated rubber.

"Brazil is the home of rubber. Without the fine trees of the Amazon forest, which for centuries have been yielding the precious milk from which rubber is made, the mighty industry which the exhibition illustrates would have been impossible,

" It was hardly to be supposed that so valuable a national asset would be allowed to develop without rivalry. Thirty-five or thirty-six years ago some thousands of seeds were taken from Brazil and planted in India, Ceylon and in the Malay Estates. The result of the successful germination of those seeds have been so remarkable that the output of plantation rubber will probably be at least as great as that from Brazil.

" As the word's consumption of raw rubber bids fair soon to exceed 100,000 tons per annum (apart, that is, from the enormous quantities of reclaimed rubber which are used every year). we have here a very interesting situation, which is being watched with eager attention not only in Brazil and in the East, but by the manufacturing markets of two continents." —*New York Journal of Commerce.*

History of the Commercial Development of India Rubber.

BY S. FRANKENBURG.

The first notice of India Rubber or caoutchouc we can trace is to be found in a work written by Antonio de Herraray Tordesillas (published at Madrid from 1601 to 1615), describing the voyages of the Castilians from 1492 to 1554. In this mention is made of the natives of Hayti playing a game with balls made from the gum of a tree, doubtless India Rubber.

Again. in dealing with the conquest of Mexico, the Castilians found trees in which the natives made incisions from which there flowed a milky substance that converted itself into " a white gum with a pleasant smell." Juan de Torquemada, in his book " The Indian Monarchy," published in Madrid in 1615, was the first to give an accurate description of the leading characteristics of the trees (" Ulequahuitl," or *Castilloa elastica*) which yielded this gum, and of the method employed by the Indian natives to collect it. Torquemada states that the Indians used the rubber for medicinal purposes, and that the Spaniards in Mexico were the first users of waterproof cloaks.

In 1736 Lacondamine sent to the Paris Academy of Science from Brazil a dark, resinous lump of caoutchouc, from which the natives made torches. He later found the Hevea tree growing along the banks of the Amazon. The Indians of this district gave the name of " Cahucha" to the resin, the waterproofing properties of which were well known to them.

In 1762, Fusset Aublet, a French botanist, discovered the rubber tree in French Guiana, and named it *Hevea Guyanensis* : whilst about the year 1765 another Frenchman, M. Coffigny, found rubber trees in the Island of Madagascar.

During this time the new resin was the object of study by a number of chemists with a view to making use of it for manufacturing purposes. Their great difficulty was to find a good solvent.

In 1761 Herissant and Macquer found a satisfactory solvent for caoutchouc. By dissolving it in oil of turpentine rectified over lime they obtained a pasty mass which allowed the rubber to regain its former elastic state. They pointed out also that ether might also be used as a solvent.

In 1770 Dr. Priestley found that rubber could be used for erasing pencil marks, and Magellan introduced this use of rubber into France in 1772. The price at that time was about 20s. an oz.

In 1798 rubber had been found in Penang, by Mr. J. Howison, who discovered the tree known as *Ureceola elastica*, and shortly afterwards in Assam by Dr. Roxburgh. The tree he found there was the *ficus elastica.*

In 1791, Samuel Peal took out the first patent in connection with rubber, "For application of dissolved India rubber to waterproofing, the solution in spirits of turpentine to be spread over the fabric with a brush." Peal does not seem to have done anything with this patent, and it was 29 years before the next patent was taken out, this being granted to Thomas Hancock on April 29th, 1820, and was "For an improvement in the application of a certain material to various articles of dress and other articles that the same may be rendered more elastic."

In 1823 Charles Macintosh brought out a patent for waterproofing fabrics by a solution of India rubber in coal, oil or naphtha, and established a factory for the manufacture of waterproof articles at Glasow. This factory he later on moved to Manchester. He formed a partnership with the Messrs. Birley, the firm being called Charles Macintosh & Co. This is still one of the largest factories in this country, and although there is now no Macintosh in the firm, the third and may be the fourth generation of the Birley's are still actively connected with it. It was in Manchester then that Charles Macintosh began to make those waterproof coats which still bear his name.

Up to this time the rubber had been coming into the country in the form of bottles and of figures, and a difficulty was found to get the material of uniform thickness. Hancock in London had in 1826 made for him a machine worked by man power to masticate the rubber. This machine would take a charge of one pound. Next year he moved to a larger place in Goswell Road, where he had a horse mill put up and fixed here larger masticators, and also iron rollers through which he passed the raw rubber when hot, which process he found formed into a rough corrugated sheet, thus bringing it into a good state of preparation for the masticator and also greatly facilitated drying. The charges he was now putting into his machine were of 14 to 15 lb. in weight. The same machines are still used to this day with very few alterations, with the exception that they are much larger.

Hancock was now manufacturing all kinds of elastic articles such as garters, braces, knee-caps, surgical bands, etc. In 1823 he commenced making billiard table cushions, and in 1826 he was making rubber driving belts for machinery and card fillets for carding machines. He had in 1825 taken out a license from Macintosh for the use of his patent. This he now began to apply to air-beds, air-cushions, etc. He also made life preservers of rubber. About this time his brother, John Hancock, started making rubber hose which was taken up in the first place by breweries. Thomas Hancock next took in hand the manufacture of diving suits and tubes for supplying air to the diver. In 1828 he started a factory in Paris principally for the manufacture of elastic webbings.

In 1830, Hancock joined Charles Macintosh and Co., still, however, keeping up his place in London. During the next few years other people started experimenting with the manufacture of rubber articles.

The one disadvantage of the waterproof articles manufactured by Hancock and Macintosh was, that they would not stand the extremes of heat and cold. In 1832 a German chemist, Ludersdorf, discovered that sulphur mixed with rubber dissolved in turpentine took away the viscosity but he does not seem to have gone further in the matter, It was an American, Nelson Goodyear, who first solved the great secret of how to produce rubber articles which would keep their nature in the extremes of heat and cold. Goodyear's partner, Nathaniel Hayward, accidentally dropped on a heated stove some rubber mixed sulphur, and afterwards noticed how the sulphur was taken up by the rubber, which itself became elastic and kept its nature when afterwards exposed to the sun's rays. This was in 1839. Goodyear saw the possibilities of this discovery and further developed it. He had already been experimenting with rubber dissolved in alcohol, and in 1836 had secured a contract from the U. S. Government for waterproof mail bags, which, however, had been found useless at high temperatures. Goodyear finally took out an American patent in 1844 for his vulcanising process.

In the meantime, however, Hancock had in 1843 taken out a British patent for practically the same process, so that when in 1847 the Hayward Rubber Company of America started importing rubber overshoes into the country, they were challenged by Charles Macintosh, who stated they were infringing Hancock's patent. The matter was, however, arranged amicably by Macintosh granting the American firm an exclusive right to sell in this country overshoes of their own manufacture.

1846 Alexander Parkes took out a patent for the cold cure of vulcanisation process, which consists in immersing rubber in a solution of sulphur, chloride, and carbon bisulphide. This process showed that heat was not necessary for the vulcanisation of rubber.

Rubber at this time was replacing leather for many purposes. In addition to the uses already mentioned it was now being used for steam valves, for door springs, for railway buffers and also for rollers for printing. It now came into use for carriage tyres, and in 1850 Lt. Halkett, of the Royal Navy, brought out his rubber collapsible boat, which is still used by many a yachtsman. The use of rubber for manufacturing purposes was now becoming very wide-spread, and during the next 30 years new factories were springing up.

In 1886 a patent was granted for printing patterns on the rubber face of faced cloth, and about the same time a process was brought out to get rid of the smell from waterproof cloth, which had prevented the Macintosh from being very largely used. These two processes brought the waterproof garment into much wider use, more especially for ladies, who up to this time had not been specially catered for.

About this time also the bicycle was becoming popular, and the manufacture of bicycle tyres gave a further impetus to the rubber trade. This was further strengthened by the introduction of the pneumatic tyre by Michelin and Dunlop.

The great development in electricity for lighting and power purposes also created great demands for rubber for insulating purposes.

Next came the great development in the use of motor cars,which made a further demand on the rubber industry; in fact with the lowering in price of motor cars, which brought them into popular use all over the world, and the resultant demands for tyres, the demands for raw rubber had become great, and was increasing so rapidly, that in the beginning of 1910, there was a temporary shortage of supply, which with the help of speculation sent up the price of Pará rubber in less then 18 months from 2*s*. 9*d*. to 12*s*. 6*d*. per lb.

The following figures will serve to show the great increase in the demand for rubber. In 1830 the total export of rubber from America was 25 tons. In 1850 this had grown to 750 tons. In 1870, 1,500 tons. For the season 1900—1901 the receipts of rubber of Pará alone was 27,600 tons, whilst in 1910—1911 the receipts of Pará was 37,500 tons. Besides this increasing quantities were being exported from Africa and from the Eastern plantations.

Plantation Rubber.—It was in June 1876, that the first supply of *Hevea* seeds was introduced into England, Mr. Wickham having collected them in the Amazon Valley on behalf of the Indian Government. A few weeks later, 7,000 seedling *Hevea* plants, grown from these seeds at Kew, were sent to the Eastern tropic Botanic Gardens mostly to Ceylon. To show what bearing the plantations will have on the rubber market in the near future, the amounts of rubber exported from there during the last few years have been as follows:—1908, 2,500 tons; 1909, 4,600 tons; 1910, 7,050 tons; 1911, 12,000 tons.—*Journal of the Chemical Industry.*

Ceara Rubber in Uganda and Nyasaland.

Thanks to Mr, Samuel Simpson, who, after taking up the reins as Director of Agriculture at Entebbe, Uganda, kindly sent us their last Agricultural report, we are able to give the following particulars of Ceará planting in that Protectorate. The total area planted with this variety is given as 17 acres, of which 13 acres were planted last year (1911). The oldest trees were planted 13 x 13 in November, 1909, from seedlings four months old. The situation was rather wet, but after being drained the trees did very well, and a small number have been recently tapped. Those planted in October, 1910, at 10 x 10, have grown very well, though there is a great deal of difference in the size of individual trees. The average girth of these latter trees at 3 feet from the ground is 1·86 inches, whilst the largest is 16 inches, and the smallest 6 inches.

The trees planted during last year were placed at various distances apart, with the object of determining the most suitable distance. One acre and a half was planted 12 x 12, a second one 14 x 14, whilst five acres went 16 x 16. All the above were planted on the square system, and a second plot of five acres, 16 x 16, was planted on the hexagonal system, which gives a more equal distribution of the trees and a greater number per acre than the square method. The growth of the trees all round has been very good, and the breakages by wind very few, and in those cases where the tops have been broken off a new top was speedily formed. Tapping was commenced on twenty trees on November 15, (1911), and continued to the end of December. The yield was small, but the trees were young, and the season not very favourable. These trees were again tapped in March, and gave better results; and twenty smaller trees were also tapped, these giving similar results to those obtained with the trees tapped in November and December. The method of tapping in each case was the "half herring-bone" to half the circumference of the trees, paring and pricking immediately afterwards. In the first instance the height tapped was 4 feet, but in the two latter cases 5 feet, the lateral cuts being 1 foot apart at an angle of 45°. No chemicals were used in the first instance, but in the two latter instances a dilute solution of Ammonia was placed in the collecting cups to prevent coagulation, and gave good results. The trade preparation known as "Purub" was used for coagulating. This also proved satisfactory, but it would be well to delay any definite opinion until the rubber has been analysed. The trees which have been tapped show no sign of injury through tapping, and are growing quite as vigorously as those which have not been tapped. The following are the results obtained in tabulated form. The trees (20 in each case) were tapped on alternate days, say :—

			Dry rubber obtained.			
(1)	(2)	(3)	(4)	(5)	(6)	(7)
16·45 inch.	Nov.—Dec.	20	7·625	2·375	10·00	2·50 oz.
17·32 „	March	14	9·50	2·00	11·50	4·10 „
15·60 „	„	12	5·00	1·00	6·00	2·50 „

(1) Average girth at 3 feet from ground; (2) period of tapping; (3) number of times tapped; (4) total biscuit; (5) total scrap; (6) biscuit and scrap; (7) average per 100 tappings.

As the trees were planted in November, 1909, when they were four months old, they were nearly two and a half years old in November, 1911.

A small number of *M. dichotoma*, *M. piauhyensis*, and *M. heptaphylla* were planted out in March, 1910, but the two latter species were attacked by white ants, and nearly all of them died. The *M. dichotoma* has grown very well, but it is too early to say whether it is likely to prove better than the ordinary type.

Coming to another African Protectorate, that of Nyasaland, we learn that the cultivation of Ceará rubber is receiving more attention than formerly. Thus reports Mr.Stewart McCall in his report issued as Director of Agriculture. Whilst this rubber has been grown in most parts of the Protectorate, it makes satisfactory growth only in rich soil with good rainfall, and is quite unsuitable for light, sandy soils, found in districts with a rainfall under 40 inches unless planted along streams or on alluvial flats near the river where the roofs can reach water. A humid atmosphere evidently is found favourable in Nyasaland for Ceará, both from point of growth and the future life of the trees under "tap." Hot, dry weather, it is found. prevents the proper healing of the delicate cortical tissue exposed by the tapping knife. It has been noticed that those trees always recover best which have been tapped during the wet season, or in the early part of the dry months. On this account it is dangerous to continue tapping far into the dry season.

West Nyasa and south-east M'lange are said to be the most suitable districts for Ceará, although, the report adds, good rubber can also be grown in selected places throughout the Shire Highlands and on the Upper River; but planters are warned against laying down this rubber on an extensive scale until further particulars are forthcoming regarding yields, the life of the tree, &c.

As leading that way, it is worth carefully noting that in the experimental gardens at Zomba some 200 trees, which have now been tapped for three years, have made a perfect recovery. As Zomba is by no means a rubber district it is anticipated that, with care as to time of tapping and the methods employed, Ceará will prove a commercial success in West Nyasa and the M'lange District.

A word of warning, however, is put forth against a tendency to plant in all parts of the Protectorate with a view of increasing the value of estates. When this is done, we are told, the expense is not justified, for the trees are only suitable for cutting down, as their growth does not warrant the expenditure of keeping them sufficiently clean to prevent bush fires from entering the plantations. Again, a considerable area that would have been very suitable for cotton and tobacco, if green manure has been put under rubber, for which, on account of the situation, soil and climatic conditions, it was utterly unsuited, and so no good was obtained from the money invested. Under such conditions the trees have the appearance of struggling for sheer existence, and show no chance of ever producing rubber on a profitable basis. When these mistakes are made, the best thing to do is to recognise that it is a mistake and to remove the Ceará trees, plough up the land, and sow with green manures for a season, and then plant rotation crops of tobacco and cotton.

Most crops should be planted at increasingly wide spaces as the soil grows richer, so as to allow the trees room to expand, as they will do when well fed; but with Ceará, at any rate in Nyasaland, the tendency is to plant the rubber closer than hitherto, so that now considerable areas are planted 9 x 9 (to the acre), when the soil is rich enough to bear so large a number to the acre, but to expand to 12 x 12. and even 15 x 15 (302 and 193 tress to the acre) for poorer soils. The closer planting is considered to probably be a good practice when possible, as the continuous overhead shade protects the soil and the delicate cortical tissue from the direct rays of the sun, and tends to help make it possible to continue tapping further into the dry season.

Ceará rubber, Mr. McCall tells us, can be tapped very early in Nyasaland without bad effects, and, although it is generally considered that the rubber from young trees is inferior on account of the high percentage of resin, latices from two-to three-year-old trees in the M'lange District are producing rubber which is selling at only a few pence below the best Pará. When preparing such rubber the great secret is the use of plenty of water, and adequately and thoroughly washing the rubber before rolling it out into biscuits.

During the tapping season in the M'lange District each tapper with his assisting boys brought in ¼ lb. dry rubber daily from 2½-years-old Ceará, at a cost in labour of 3*d*., equal to 1*s*. per lb. for cost of collection. This was from a small area of 540 trees, planted 9 x 9, of which only 270 trees were considered large enough for tapping. As each man and boy had 90 trees for their task, it took three pairs to tap the 270 trees, which were tapped on each alternate day in groups of 45. As regards yields, Mr. McCall reports that he saw the returns weighed for some weeks, and found that they averaged a little over ¼ lb. dry rubber daily from 45 trees. Such a return, it is reckoned, would work out at about 5 to 6 oz. dry rubber a year in six months' tapping, after which the trees are left until the next tapping season. At the conclusion of his remarks on Ceará rubber, Mr. McCall states that he believes this rubber will prove a paying crop when planted in the right district, but that he does not consider it suitable for general cultivation throughout the Protectorate. The following measurements are worth noting:—

***Measurement of Ceará trees, 3½ years old, in West Nyasa District, planted* 15 x 15.**

Average girth of 101 trees at 3 feet from ground ...	19'43	inch.
Girth of best tree	30	„
Girth of worst tree	13	„

Measurement of Ceará trees, 1½ years old, in West Nyasa District, planted 10 x 10.

Average girth of 105 trees at 3 feet from ground...	10·66 inch.
Girth of best tree	17 „
Girth of worst tree	8 „

The total area planted by Europeans with Ceará is given as 7,542 acres in 1911, against 4,403 acres in 1910. The estimated crop from the Blantyre District, 3,646 acres planted, was 4,470 lbs. for 1911, whilst Zomba, with 1,345 acres, was expected to yield 500 lbs. last year.

In the general remarks added by Mr. E. N. Davy, the Government Agriculturist, we learn that the rubber planted in 1909 has generally made fair growth, the plants propagated from cuttings maintaining a superiority over seedlings, whether the latter were raised at stake or transplanted. The plants required frequent pruning in order to produce clean stems six or more feet high. An experiment in germinating Ceará seeds has yielded a curious result. Six hundred seeds were divided into six sections and sown in January, 1910, one batch of seeds being untreated, whilst the remainder had been soaked in water for periods varying from one to five weeks previous to soaking. Twenty per cent. of the dry seeds germinated within three weeks, but the remainder, together with all soaked seeds, remained dormant until December, 1910, when the seeds in the various sections germinated simultaneously to the extent of 95 per cent.; thus showing that soaking the seeds in water does not always expedite germination.

Of the other Manihots, *M. dichotoma* produced a fair crop of seeds, which were planted out but the germination was far from satisfactory. The growth made has been fair, but the trees are not yet large enough for tapping. *M. piauhyensis* (known locally as Remanso) ripened a few seeds only. The plants have made comparatively little growth, and would appear to reach their maximum height in three years.—*Tropical Life.*

The Manuring of Rubber Trees.

The following is an abstract, in the *Bulletin of the Bureau of Agricultural Intelligence and of Plant Diseases*, July 1912, of a paper by E. de Wildeman in *Le Caoutchouc et la Gutta-Percha* for March 15, 1912, p. 6037:—

It has been demonstrated that the use of a certain amount of manure is necessary for the successful growing of rubber trees. Some chemical compounds not only exert a favourable action on the development of the trees, but also on the yield of latex. Thus it appears from various experiments, which, however, are not completely conclusive, that nitrate of soda increases the flow of latex and the proportion of rubber.

At Hawaii some manihots were manured with nitrate of soda buried to a depth of 4 inches. The experiment was conducted with three lots of manihots. The first was kept as control, the second was manured with ¼ lb. of the salt per tree and the third ½ lb. per tree. The control trees yielded during the experiment 1 to 2 oz. of dry rubber each; those of the second lot 1 to 3 oz., and those of the third lot 2 to 3 oz. per tree. The effects of the nitrate begin to show after forty-eight hours. (See *Agricultural News*, Vol. X, p. 265). M. E. Lierke has demonstrated that potash plays a most important part in furthering the development of Heveas, but it must also be borne in mind that manures, and especially potash, seem to favour the development of plant parasites also.

Among the rubber growers in the East, lime as a manure raises at present the greatest interest. The value of lime must be considered according to the soil in which the trees are grown. In the Middle East the soil is peaty, clayey or sandy. In peat soils deep drainage is advisable, after which the soil must be allowed to dry and then it is limed in order to neutralise its acidity. Clay soils improve physically after the addition of lime; they are easier to till and do not crack after prolonged drought. In sandy soils lime improves the cohesion. Lime acts also directly as plant food; it prevents the development of the weeds which infest acid soils, and its application may also become necessary after the repeated use of other manures, such as sulphate of ammonia, kainit, and superphosphates which, in the long run, produce a certain amount of acidity in the soil.

Lime further stops the development of fungi which produce root rot, and especially of *Fomes semitostus*, which causes serious injury to Heveas.

It is recommended to slake quicklime with water, allowing it to turn to a dry powder, and then to spread it broadcast at the rate of about 5 cwt. per acre, and at least four times as much on peat or clay.

Experiments conducted in tropical regions where the rainfall is abundant show that it is preferable to apply lime and the other manures during the relatively dry season.

In the Malay States the following formula is recommended:—

	Quantity per acre.
Slaked lime	½ to 1 ton
Basic slag	350 lbs.
Sulphate of ammonia...	150 „
Sulphate of Potash	100 „
or kainit	400 „
or chloride of potash	100 „

Instead of salts of ammonia, castor oil, linseed, cotton seed, earth nut, (ground nut) or Hevea seed cake may be given, and guano may be used instead of basic slag.

Most crops grown between the Hevea trees appear to retard their development and diminish the yield of rubber. Tapioca (cassava), sugar-cane, and pine-apples exhaust the soil considerably; coffee and cacao are not so harmful, especially if the plants are kept at a sufficient distance.

There is a good deal to be said both in favour of and against the use of artificials or of green manures, and the planter must judge according to his special conditions and decide which type of manuring may be most useful, or whether he may not preserve and improve the fertility of the soil by 'clean weeding,' and sterilize its surface by the heat of the sun. This last method naturally requires a great amount of careful labour which cannot always be given.—*The Agricultural News.*

Messrs. Marshall, Sons & Co., Ltd., Madras, inform us that they have received a cablegram from their Works in England advising an advance on the current prices of all Jackson's Patent Tea Machinery, which they manufacture.

The increase is due to the excessive rise in all raw materials and the enhanced rates for skilled labour now ruling at home.

Revised catalogues and Price Lists are being published and will be circulated as soon as possible.

The Planters' Chronicle.

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THE U. P. A. S. I.

(INCORPORATED.)

CORRESPONDENCE.

Kalisyndikat, G. M. B. H.,
Berlin, October 21st, 1912.

The Secretary,
U. P. A. S. I.

Dear Sir.—We beg respectfully to inform you that Mr. Paul Friedrichsen, the former Manager of our Propaganda Offices in the Bombay and Madras Presidencies has been appointed to our Head Office here and that Mr. R. Birnie, M.A., B. Sc., from Scotland, has been selected to succeed Mr. Friedrichsen in India.

We take the opportunity of thanking you for the courtesy shown to Mr. Friedrichsen and for the confidence placed in him during his stay in India and we trust you will extend the same towards his successor, who is expected to sail for India about the latter half of November.

As formerly, our Agricultural Office will be located in Bangalore.

We are, dear Sir,
Yours respectfully,

Kalisyndikat, G. M. B. H.,
Agriculture-Abteilung.

A Warning.

One Abraham, East Indian, with capital character and letter to show he had recruited for Malaya, wrote asking for work and then came to Estate said he had been recommended to try self by a Police Superintendent.

Got Rs.50 to run round and see what he could do. Later wired for funds from Mysore. Got a half of what he wanted on executing Bond before a Sub-Judge. He then began to show his activity by wiring and writing from Kolar, Villapuram, Hindapur, &c., always the one theme coolies ready—cash needed; and this was all managed by him while sitting with his family at Kolar. Telegrams and letters were forwarded through relation or Station Masters.

I sent an absolutely trustworthy man with Rs.300 more after arranging a meeting with Mr. Abraham in Bangalore, to pay rail, &c., on seeing the coolies; he was on different excuses taken to Kolar and Hindapur where 3 East Indians and others eased my man of his money by threats of violence, and his watch (which as it did not go) was returned. My man was then taken to Hindapur as it was necessary to send me a telegram, which was to the effect "32 coolies have gone on to yours am going Salem." At the same time a telegram was sent to Station Master, Salem, "send all wires and letters to Kolar," and now I am awaiting Police developments. Not an anna has ever been advanced that I can learn.—H. W. R.

DISTRICT PLANTERS' ASSOCIATIONS.

South Travancore Planters' Association.

Proceedings of the Third Quarterly Meeting held in the Club, Quilon, on Saturday, November 9th, 1912.

PRESENT.—Mr. J. Stewart (in the Chair), Messrs. J. S. Valentine, J. H. Parkinson, L. G. Knight, Mitchell and A. W, Leslie, (Honorary Secretary.) *Visitor* :—Mr. A. F. Macdonald.

1. The Minutes of last meeting were read and confirmed.

2. *Sri Mulam Assembly.*—It was proposed by Mr. Valentine and seconded by the Chairman that Mr. J. B. Cook be asked to represent this Association as their delegate at the forthcoming assembly.—Carried.

3. *Cooly Rates.*—After some discussion it was resolved that a general understanding by the members present for a combination to adhere to the present rates.

4. *Waste Lands.*—Resolved: "That the Honorary Secretary write Government that " Persons or Companies who hold properties or land within the Reserve should be allowed to extend their property by taking up land adjoining, by purchase, at the upset price, and to the extent of say 30%."

5. *European Ward.*—Resolved "That the Honorary Secretary be asked to remind Government of the urgent necessity for the completion of the European ward proposed to be added to the Quilon Hospital."

6. *Post Office and Mails.*—Mr. H. W. Heberden's letter dated 17th October read as follows :—

Shaliacary Estate. Punalur P. O., 17/10/1912.

The Honorary Secretary,
South Travancore Planters' Association.

Dear Sir,—I enclose letter from Punalur Post Master which explains why Ceylon letters and papers are always a day late.

Will you kindly write the Post Master-General and try and get mails brought up by the 11 a.m. train from Maniachy as was previously done? This train also could well take letters to Quilon from intermediate stations which is not now being done. Our mail service here is a disgrace at present, and I think you will agree with me that it is quite time we unanimously complained.

Yours faithfully,
(Signed) W. H. HEBERDEN.

And the following explanation dated 16th October from the Sub-Post Master, Punalur, to Mr. Heberden was read :—

POST OFFICE.

From the Sub-Post Master, Punalur.

To H. W. Heberden, Esq., Shaliacary.

Punalur, 16/10/1912.

Sir,—Your letter of date, the morning train from Shencottah does not bring any mails from Shencottah to Punalur. The evening train which reaches Punalur at 3 p.m. brings mails from Shencottah, Kalthuritty and all places beyond Shencottah. The Ceylon newspapers, etc., which formerly arrived by 6 p.m. Mail now come by the 3 p.m. has been discontinued some months back. The Ceylon newspaper coming in your bag to-day has been posted at Colombo on the 14th. It reached Tuticorin on the morning of 15th. It could not catch the Mail which reached here at 3 p.m. on 15th for by the time it reaches Maniyachi, the train for Punalur has already left, so that the newspaper remained at Maniyachi and catches the train only to-day which arrives Punalur at 3 p.m. It is delivered to you to-morrow 17/10/12. Formerly this newspaper arriving at Tuticorin the next morning would come here directly the same evening and be delivered to you one day earlier.

(Signed) ....
Sub-Post Master.

It was then resolved : "That the Honorary Secretary forward a copy of the above correspondence to the Post Master-General and at the same time point out the great inconvenience caused by this unnecessary delay in the transit of Colombo mails."

Government Gazette.—Resolved : "That the Honorary Secretary send subscriptions for the Travancore Government Gazette to be taken in annually."

This being all the business, the Meeting closed with a vote of thanks to the Chair.

(Signed) A. W. LESLIE,
Hon. Secretary.

TEA FOR THE WOUNDED.

INDIAN ASSOCIATION'S GIFT TO FIELD HOSPITALS.

Times of Ceylon Office, 27, Mincing Lane. London,
November 7th, 9-35 a.m.

The Indian Tea Association is sending a gift of 1,000 pounds weight of tea to the Red Cross and Cresent Societies working in the Turkish and Balkan field hospitals.—*The Weekly Times of Ceylon.*

KOTMALE PLANTERS' ASSOCIATION.

Coast Recruiting.—The Chairman brought to the notice of members that instances of kidnapping of minors for recruitment as coolies had been brought before the authorities in India and in a certain case had resulted in a sentence of six months' hard labour, and that the Magistrate had caused a circular to be issued throughout the cooly districts.—*The Weekly Times of Ceylon.*

Tea.—In sympathy with the keen demand for China tea this past season the export of scented capers to London shows an increase on that of the previous year, although shipments of Kooloo to the colonies are smaller. The cost of the leaf and scenting flower was higher than in the previous year.—*Diplomatic and Consular Reports, China. Report for the year* 1911 *on the Trade of Canton.*

NILGIRI NOTES.

In a District like this where the conditions are so varied it is difficult to give an exact idea of the conditions of weather and crops as a whole, and so these notes must be taken merely as an average indication.

Weather.—The S. W. Monsoon started early but was weak during the latter part of June and July, and in August there was a complete break of about three weeks of fine weather; this break, with occasional showers lasted in some parts up to the 10th September. From this date to the end of October there was good North East rain, and after another short fine spell rain has now set in again. Taken all round it has been a grand planting season. Tea has been flushing well, and the distribution of rain should prove beneficial to the quality of coffee.

Tea is booming, and Nilgiri Estates have been realizing remarkably good prices. This encouragement has caused renewed activity in extending the Tea area of the district, and it seems likely that Tea will oust Coffee from its position as the premier product of the district in the near future, as it has already done in the Wynaad.

Coffee.—This of-late-years-much-despised product is in a very strong position as far as prices are concerned, but the pity of it is that many Estates have been severely weakened by Green Bug and the many evils that have followed in its wake, and there are but few that are bearing crops. In parts, though the yields expected are still very good, in spite of reduced estimates, especially round Coonoor and Kartairy, and with Coffee now selling at Rs.57 to Rs.58 ex curing per cwt., these estates will show remarkably useful profits. The great feature of this season has been the diminished activity of Green Bug early in the year, and is being kept in check by the early June rains, so that now the amount of bug alive is practically nil everywhere. All estates that have been kept in fair order are looking healthier than they have for years.

Of *Rubber* one hears but little as most of the district is too high in elevation for it to do well. Some estates are in tapping, but the yield is not generally good.

Labour.—What would happen in this district if it were not for the fairly abundant supply of " locals " is difficult to imagine, and even as it is the pinch is beginning to be felt on a number of Estates. Still many planters seem to be fighting shy of facing the Labour problem by *doing* something instead of eternally *talking.* Apparently the Labour Committee are marking time as most of the District Associations are so reluctant to give definite opinions as regards the latest Registration Scheme.

The Experimental Plot which has been started seems to have resulted in some want of cohesion between the local Planters and the Scientific Officer. This is a poor state of affairs for a start, and what will happen later on goodness only knows, and most planters round here appear to care less! Under the circumstances it seems to be a pity it was ever started. However it is to be hoped that it will justify its existence at some future date. When expert opinions differ it is hard to come to a conclusion. One expert avers that the land is too steep to ever be able to do good work. His neighbour declares it to be the most suitable spot in the district. One expert maintains it was started for one special object, others disagree as to the primary object of the plot. In the meantime no definite scheme of work has been formulated, or at least nothing that anyone knows anything about. It is about time for the U. P. A. S. I. executive to step in and arrange what is to be done and under whose control.

17th November, 1912.

TEA.

Market Position and Prospects.

Since the last notes were made, for publication much that is of moment to the tea trade and deserving of notice and comment, has happened. On that occasion the change which had taken place in the conditions that had so long prevailed was recorded and emphasised—a change from supplies of doubtful sufficiency to abundance; a change from somewhat inflated quotations for common tea to a reasonable price, with its invariable accompaniment of increased demand for the finer qualities: and a change from a stock too low for the trade's convenience and security to one some 20,000,000 lbs. heavier. The probable effect of these changed conditions was discussed, and for reasons given the conclusion was reached that in existing circumstances what had occurred was thc best thing that could happen in the general interests of producers, the trade and consumers. The position and probable policy of importers were examined, and while it was recognised that the Ceylon growers would pursue their usual course of freely selling, but wouid soon have much less to offer, it was suggested—upon information about the crop possessed—that the Indian producers would have to sell for six months at an average rate of 50,000 chests per week.

The sequel was interesting. It disclosed a difference of opinion as to the need for this being done and the wisdom of it, but our estimate could not be reduced—indeed, it was only 2,500 chests per week more than the average of the six months' corresponding sales in 1911-12—and now it is necessary to extend it a little, and, with knowledge that Indian's output may be so good as to give 20,000,000 lbs. increase upon the previous crop, to anticipate weekly auctions averaging 55,000 chests of Indian tea alone, unless some of the large growers follow the good example set at the beginning of 1909 by the Dooars Company and three-others, and dispose of a large portion of their crops for forward delivery by private contract. How will the market stand such an ample supply, and what will be the price of tea three months hence? No one can answer these questions, because the result will be greatly influenced by the quantity that Ceylon succeeds in contributing; by the Bank Rate; the experience to be gained as the weeks pass as to the extent to which our home and foreign trade expands with cheaper tea and plenty of it, and as to the quantity deflected from London by direct purchases made in Calcutta and Colombo or through transhipment.

Uncertainty as to the future of prices is enhanced by what has been taking place in the London market during the last six weeks. All the Ceylon and Java tea that could be marketed has been promptly offered at auction; the Indian growers have sold at the rate of 59,000 chests per week: the buyers have been called upon to handle and finance more than ever before; their physical powers and time, as well as their means, have been severely tried yet up to the end of last week there has been a sustained and brisk competition, with a frequent tendency for prices to improve. In the meantime, there has been no more than a very small increase in deliveries for export to give encouragemeut, nor such an improvement in quality as to attract buyers, except in some of the receipts from Ceylon. What is the explanation of a market and prices so such stronger than some of the importers and their brokers expected?

Inquiry into the reason of the confidence shown by the buyers at large discloses an interesting diversity of opinion. It is thought by some to be due to an extensive business done by the wholesale traders with their retail customers in town and country, who have been "stocking up," mindful of their recent disagreeable experience, when they had too little—and it is true that whenever the retailers are buying freely from dealers and blenders there is activity in Mincing Lane; by others it is thought that the buyers do not consider the crop of such poor quality as it was announced to be beforehand, and find it good enough for their purpose and cheap; some suppose that the buyers, who see that China supplies are reduced and limited, are apprehensive that Ceylon shipments may fall back to the 1910 level, and that they will not nearly reach the dimensions of the last four months of 1911, when an unexpected addition of about 8,000,000 lbs. was made; and there are others who think that the market has been influenced by the rumours circulated for a while that the Indian crop had received a check and that no great increase from that source could be relied upon.

The last explanation deserves looking into, because it implies that the market has been propped up and has stood upon an insecure foundation, which we do not believe to be the case. The smaller buyers, both for home trade and export, have always been liable to be moved and influenced by such reports, but useful as these buyers are, they no longer have the power of affecting the trend of prices, which now depends upon the action of a comparatively few large operators, perhaps a round dozen all told, embracing the largest of the wholesale dealers, blenders, packet companies, multipleshop owners, caterers and co-operative societies. Their stake in the tea trade is so large that they have their own sources of information; they are fully informed respecting crops, exports and prospects, and their continuous support to the London market is alone competent to keep a sustained movement going through several consecutive weeks. This support has been given, and with full knowledge of the position and outlook.

Has any probable explanation been overlooked? There seems to be one; it will sound extravagant, perhaps, to those to whom the idea has never occurred, yet there is much to be said for it, and no suggestion need be brushed aside that may help to explain why tea remains so near to the level of the average price ruling during the last two years, when by reason of the complete change in the statistical position, and the alleged inferiority of so much of the supply, none but the very best ought to be worth its present value—theoretically, that is to say. The explanation we offer is that no comparison between this year's prices and those of the last eighteen months or two years is valid, because it was only through quite exceptional circumstances that tea did not advance many pence per lb. higher than it actually touched. There were times when the position was such that if tea had been coffee, sugar, cotton or any article in which there are "term markets" and facilities for speculation, it might have easily been cornered by one or two bold operators and a new level of price created—for a time only, to be sure, yet so high as to make our present quotations seem quite low. It was well for all concerned that nothing of the sort occurred, as there is nothing that the tea trade dreads more than sudden or severe fluctuations caused by the activities of speculators; nothing that the wisest amongst its leading men in the past have more regularly discouraged. To this freedom from speculation was added the resisting power against rising prices that the tea buyers have always shown they can exercise, and the care taken by responsible writers, who knew what a strained position existed, not to say more about it than was necessary at the time.

It can now be said that an actual scarcity of tea was in sight a year ago, and it led to the value of the common tea essential to retailers everywhere, because it is the cheapest and most demanded by the public, being raised above the point touched for about ten years. Gradually there came into view China's increase of 10,000,00 lbs, in its exports, the enlarged supply from Ceylon already referred to, and Java's addition of above 1,000,000 lbs. per month to its former output; the buyers kept their heads and their money, and by working on the smallest possible stocks they pulled through a most difficult situation. How are they situated now ?

Their position and the general outlook seem to be entirely reversed, yet so far they appear to regard it with composure ; possibly because the lowered price of common tea promises to make trade larger and more profitable; possibly—although it will sound like a paradox—because the heavy selling by importers inspires confidence. Long observation, however, has taught that teabuyers are nervous and shy when producers hold back supplies from the market, but operate with confidence when they do the reverse and let them out freely, as they are doing now. Interest in the market's development will quicken as each week passes ; receipts from India during the next six weeks must be heavy, and the stocks may seem unusually large in December ; the slack time at the turn of the year will be approaching, when tea traders have other things to attend to. and the buyers would like the sellers to give them three or four weeks' rest while they prepare for the activities of the new year. A somewhat trying time may possibly be in store for those who have nothing but low grade tea to sell, but if they have to pass through it the position of every other branch and department of the industry and of the trade will be rendered more secure and the way be prepared for a free and elastic market in the coming year.—*Financial Times*, 25th October, 1912.—*Indian Planters' Gazette and Sporting News.*

A NEW COVER CROP,

The following is taken from the first number of the *Agricultural Bulletin of the Federated Malay States*, which is a new publication issued by the Department of Agriculture of the Federated Malay States and the Planters' Association of Malaya. The plant referred to is closely related to the plant called the yam bean (*Dolichos Lablab*) in the West Indies :—

During the past eighteen months seeds of some thirty varieties of plants have been procured from India, Philippine Islands, Barbados, Antigua, etc., for the purpose of attempting to secure a cover crop for this country which would fulfil the necessary requirements. After a long series of experiments I have come to the conclusion that one of the cover crops that may possibly meet with success is Horse Gram *Dolichos biflorus.*

Dolichos belongs to the family of the Leguminosae and is either Suberect or twining in habit. It is largely cultivated in South India and is wild in the Himalayas. It is stated that on the plains of India this pulse is grown either as a green manure or as a cattle food and fodder, and that few Indian crops are perhaps more valuable in this respect than the horse gram, especially when grown as a green manure. Its great value in this respect lies in its power, in common with othor leguminous plants, of fixing atmospheric nitrogen in the soil through the agency of bacteria contained in the root nodules and by so doing it increases the fertility of the soil and indirectly the growth of the rubber growing amongst it. Being a close-growing dense shading plant it keeps the surface soil damp and prevents it from being baked by the heat of the sum.—*Agricultural News.*

COFFEE.

Coffee Estimates should be Reduced.

SAO PAULO CROP WILL NOT EXCEED 10,000,000 BAGS.

Frost Does Severe Damage—Danger of Very High Prices—Shipping Subsidy Situation—Financial Problems Connected with Coffee Valorization.

Rio De Janeiro, October, 22.—Reports are now coming in with regard to the damage that has been done to the coffee crops by the recent frost. First of all, to take the State of Sao Paulo, it would now seem reasonable that former estimates should be materially reduced; the growing crop, it is thought, will not nearly reach 11,500,000 bags, while the probabilities are that it will not exceed 10,000,000 bags.

The damage done by the frost was varying in degree. Thus a large number of young trees have been killed; other trees have been scorched and will not bear next season; while others, again have been, as it were, burned and will not bear for two seasons. It will thus be seen that the frost is far-reaching in its effects and will have its influence not only on the growing crop, but on two future crops into the bargain.

In the State of Minas the frost was also severe and a good deal of damage was done, though so far no estimates are to hand on which any reliable statements can be based.

In Parama, where there has been a great deal of new planting the young trees have suffered terribly, and in many cases whole batches have been killed.

The danger now would seem to be that prices will be pushed so high that consumption may be seriously affected.

The weather is warmer, and if there is no more frost the second flowering, now on, may set and finally ripen. The conditions do not indicate more frost, but it is impossible to say, as it is not yet too late for a further heavy fall in the temperature.

THE FINANCES OF SAO PAULO.

The Secretary of Finance of the State of Sao Paulo has presented a statement to the State Legislature dealing with the finances of the State for the first six months of the current year.

He states that during the period in question revenue collected amounted to Rs.35,905: 055$151, or £2,393,670. This includes ordinary and extraordinary revenue and the surtax on coffee. The last named gave Rs.8,363: 148$391, or £557,543. The revenue for the whole year is estimated at Rs.69,730: 000$000, or £4,648,666, so that it will be seen that the first six months have given just about half this sum. As, however, the second half of the year usually yields more revenue, it is reasonable to expect that the actual amount collected during the fiscal year will eventually exceed estimates.

Expenditure during the period is given as Rs.39,211: 925$000. or £2,614,128, while the value of special credits opened was Rs.18,338· 805$000, or £1,222,587.

A sum of Rs.24,255: 190$000, or £1,617,012, is carried forward to the second half-year.

Turning to coffee, the Secretary of State says that the stock held by Government at the beginning of 1912, carried forward from the year 1911, was 5,101,578 bags, of a value of Rs.172,164 : 242$000 or £11,477,616. This stock still remains on the books at the end of June, as the sales made during the first six months of 1912 have not been deducted, owing to the fact that the product of the sale has not as yet reached the State Treasury. As a matter of fact, the number of bags sold in the various consuming markets was 700,000, the price obtained being 68,880,000f., equivalent to Rs.41,328 : 000$000, or £2,755,200.

The actual stock on June 30 was 4,401,578 bags, representing a value of Rs.149,064 : 242$000, or £9,37.616.

According to the statement, valorization expenses still to be amortized amounted at the end of June to Rs.61.581 : 685$000, or £4,105,445. Deducting from this amount the value of the 5f. surtax collected, *viz.*, Rs.8 363 : 148$000, or £554,209, there remains an amount of Rs.53,218 : 537$000, or £3,547,902 to be paid off. From this may be further deducted the profit on the recent sales, which is put at Rs.12,000 : 000$000 or £800,000. As a result the amount actually outstanding is therefore Rs. 41,218 : 537$000 or £2,747,902. The State debt on June 30th amounted to £10,340,653.—*The Journal of Commerce and Commercial Bulletin.*

SYNTHETIC CHANCES ARE POOR.

Dr. L. E. Weber, one of the most distinguished of American chemists, who for years has been interested in artificial rubber production, does not believe Synthetic rubber will within the lifetime of most of us become commercially possible, He made that confession at the conference held in New York in connection with the Rubber Exhibition. There are obstacles in the way of polymerisation which alone make Synthetic rubber commercially impracticable. If commercial synthetic rubber ever comes he is convinced the advantage in the fight will still all be with the plantations. " In the case of Indigo. the synthetic product had practically no competition to meet. The production of natural indigo had been carried out in the crudest possible fashion and the methods of obtaining the dye from the plant were even more crude. For some extraordinary reason, although the production of this dye stuff wxs of such extreme value to the textile industry, it always remained in the hands of the ignorant native. Had the same amount of energy and skill been applied to the indigo plant that is now being applied to plantation rubber, the victory of sytheric indigo would still be in doubt." In Dr. Weber's opinion there are enormous opportunities for the plant physiologist in the cultivation and production of rubber. So far very little has been done in this direction as the plantation industry is still in its infancy, but it seems more than probable that careful experimentation will devise means whereby the yield of rubber problem is more complex, but, said, Dr. Weber, " this field of investigation is still waiting for the pioneer and I cannot help feeling that the possibilities are indeed large." By the time, if ever, that Synthetic rubber is able to come forward as a commercial proposition, science on the plantations, will have done a vast deal to destroy its chances of success, and Nature, by her prolific ontput, will have done the rest.—*Grenier's Rubber News.*

RUBBER.

Mr. Baxendale on the Rubber Industry.

Mr. Cyril Baxendale in an extremely interesting address on the plantation Rubber Industry delivered before the Rubber Conference at the New York Exhibition said it was remarkable, seeing how civilization is now dependent on plantation rubber, that the profitable cultivation of rubber should for years have been open to doubt. The earliest trees planted by Sir Hugh Low reached maturity many years before it was realised that were capable of yielding a sufficient quantity of latex to make regular tapping worth while. Mr. Baxendale's only explanation for this is that tapping was relegated to the Sakeis who adopted the methods they applied to the collection of wild rubber they hacked with choppers, and the results achieved were insufficient to tempt any capitalist to put money into the business. The primary knowledge of how these trees might be made profitable came from "our scientist friends," said Mr. Baxendale, and Mr. H. N. Ridley's appointment in 1888 as Director of the Singapore Botanic gardens was now considered a Red Letter day. To the brothers Kindersley belongs the honour of first planting rubber on a commercial scale in Malaya: they were followed by W. W. Bailey and others. Slow development was due to lack of cash, not of enterprise. It is all like a romance to-day. "We were all coffee or sugar planters" aud Mr. Baxendale, struggling for a bare, very bare existence. Some of us may have had the privilege of being on terms of a nodding acquaintance with men of means, but not many of these could recollect that rubber was useful for any practical purpose except the erasure of pencil marks." How many of the few who had seen or heard of Charles Rolls travelling in a noiseless carriage preceded by a man with a red flag as a danger signal, realised that "this object of merriment was the forerunner of the greatest mechanical industry of the age, or if they did, would not at any rate have found it a reason for supporting the schemes of would-be rubber planters."

It required a good deal of courage on the part of a few speculative or far sighted persons to sink a portion of their savings on the new enterprise. When the outside world woke up to the potentialities of rubber the boom probably exceeded that which heralded railway development seventy years ago. "It can only," continued Mr. Baxendale "be compared with another that occurred in the reign of our late Queen Anne in connection with a venture known as the South Sea Bubble. Well *our* Bubble has since deflected somewhat I am glad to say but it has not burst," and for that we have to thank the planters who kept their heads in spite of somewhat embarrassing attentions.

Turning to some of the reasons why Malaya has attracted more support for rubber growing, Mr. Baxendale mentioned first its regular rainfall. "It is commonly said that there are two reasons in that country. One is the wet and the other the d—d wet season." In 14 years on the Jugra Estate he has never known a month without rain. Monthly shortages in outputs are sometimes attributed to drought, but according to Mr. Baxendale Malay has yet to experience the true meaning of the word "drought." There are few days in the year when it is too wet to work and that of course gives Malaya a great advantage over Brazil. As for health, there has been considerable change for the better, and if many of the plantations can hardly yet be described as health resorts, improvement continues under the influence of medical discoveries. Mr. Baxendale paid a compliment to the overworked and not over-paid Survey Department. Rent and Export Duty have driven a certain amount of capital to Java and Sumatra, but the success of the rubber industry is largely due to the confidence inspired by the existence of and absolutely honest and conscientious public service. "Judging by past experience in time of adversity we may reasonably expect that if our burdens become too grievous to be borne, we shall obtain the relief necessary to meet the stress of competition." Dealing with planting and cultivation, Mr. Baxendale said that "from time to time there crops up something almost as bad as weeds." He referred to the "wearisome controversy" as to the desirability or otherwise of allowing grass to grow or of cultivating some cover plant which will extinguish weeds. "I have experimented with small areas under grass but the results have not shaken my belief in clean weeding, to be followed by digging or ploughing whenever there is a sufficiency of funds and labour. With a sufficient supply of the sinews of war, the planter can hold his own and after three or four years, aided by the shade then afforded by his trees, he becomes master of the situation." With the longed for harvest come thoughts of the factory. "When I started tapping, the word factory had not been invented in this connection. I began by settling the latex in my washing basin, rolling the rubber with a beer bottle (an empty one) and dried it on the verandah. Then acting under strong domestic pressure I moved the scene of operations to the stables and carried on there until there was no room for the horse. Next I built a little shed and bought a hand mangle. The next move was to the factory of to-day."

There were many other illuminating items in Mr. Baxendale's excellent address. Speaking of cost of production, which high salaries of superintendents and high wages of coolies have swollen he said it seemed to him only right and proper that those responsible for supervision should enjoy some of the fruits of the industry when the industry could well afford it. In estimating yields, calculations should be based upon the yield per acre. A well-known botanist who studied the Hevea in its native land used to urge us strongly to plant at 40 x 40, *i. e.* 27 trees to the acre. If Mr. Baxendale had taken the advice he found that he would have harvested less than half the quantity of rubber he has obtained from a given area. As for labour prospects, "It is true," said Mr. Baxendale "that most plantations are at times short of labour, but he thinks this must generally be attributed to the Managers' desire to keep down expenses. Tamil coolies are easily recruited where estates are not for some reason unpopular. The success of such estates will depend on the attractions they can offer to Chinese or Javanese, who can be secured in any number—at a price." "It must be remembered that by doubling the cost of labour we do not double the cost of production. Generally speaking labour is less than one half, if home charges are included, and as trees come into bearing labour rates can if necessary be materially increased without raising the cost of production when the trees attain maturity." Mr. Baxendale follows experiments in manuring with interest but his own opinion is that for some years to come at least systematic cultivation of the soil will be of more value than any manure.

Reviewing various estimates as to production, Mr. Baxendale said that the struggle between plantation rubber and wild rubber does not appear to be very imminent: the most pessimistic calculation gives an increase in consumption of about 14,000 tons per annum and at that rate the requirements six years hence will amount to 184,000 tons annually. The prosperity of the plantation industry, Mr. Baxendale reminded manufacturers, depends on the growth of their industry. "We can" said Mr. Baxendale in conclusion, guarantee an enormously increased supply of rubber and will in future years be content with a much lower price than now prevails. What we want to know is whether there is to be a glut in the market and a scramble to sell with every successive increase in the supply. Perhaps, gehtlemen, you can allay the misgivings of those planters with the weaker faith in the future of the industry and can send them through me assurances which will encourage them to hope for a continuance, even in a modified degree, of the prosperity we have recently enjoyed, a prosperity which, I believe, has never been rivalled by the agricultural industry in all the history of the world."

Mr. Baxendale's address was followed with keen attention by a very large body of chemists and manufacturers as well as representatives of producing interests. It was agreed that it gave them a most valuable idea in small compass of what is being done by Mid-East planters, and in the discussion which followed a good deal was said about the use of harmful chemicals in coagulation. Mr. Baxendale was able to reassure the manufacturers and chemists and to prove that only acetic acid is used by the largest producers. Vendors of patent coagulants receive litttle encouragement. He will of course take the first opportunity of communicating to plantation managers the views brought out by the discussion, and there can be no doubt that the debate will have served a most excellent purpose by enabling planters and the American manufacturers to understand each other's aims better.—*Grenier's Rubber News.*

RUBBER FAILURES IN OTHER LANDS.

H. and U. which is a South American Company was floated in May 1910 with a flourish of trumpets. The capital was £195,000. The front page of the prospectus was headed 1,070, lbs., of rubber are now available for collection. This was underlined. Here is a greater than Linggi, Pataling or Selangor remarked the unwary. And the statistical pundits were able to prove that H. and U. was one of the finest undertakings ever offered to the public. Even the veriest Simple Simon could tell that, for H. and U. owned 400,000 acres of land. And the purchase price was only £140,000 or 7 per acre. And the Chairman told the shareholders that rubber could be brought into bearing at a much lower cost than the poor Eastern Plantations. And unfortunately they believed in him. The prospectus wallowed in fine promises. Rubber alone from a small portion of the property was to bring in annually £54,094. And the H. and U. brand had been well known in Mincing Lane for years. But one statement was difficult to swallow. The vendor Mr. Uribe had relinquished the management for a post in the Columbian Civil Service. This was on a par with Mr. Rockfeller giving up his interests in Standard Oil for a post in an American Post Office. All the visions have now disappeared. The rubber still remains uncollected. The capital had vanished. The prospectus stated, "the various members of the families owning the properties and occupying prominent positions in the Church and Diplomatic service are men of wealth, and as their other interests make it impossible for them to give personal supervision to the business, they have decided to transfer their properties to this Company." These distinguished persons are now indulging in the pleasures and delights of Paris, Lima and Rio, while the English shareholders are revelling in the delights of liquidation.—*Grenier's Rubber News.*

The Planters' Chronicle.

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THE U. P. A. S. I.

(INCORPORATED.)

DISTRICT PLANTERS' ASSOCIATIONS.

Wynaad Planters' Association.

A Special Meeting was held at the Meppadi Club, on Wednesday, November 27th, 1912.

PRESENT: Messrs. Darkin, Egan, Gillatt, Macbain, Macleod, G. R. C. Parker, Powell, Stewart, Vernede and C. E. Abbott, (Honorary Secretary.) Mr. Gillatt in the Chair.

1810. A ballot was held for the election of a Member of Council to represent the Planting Community. The Chairman announced that Mr. E. F. Barber had been unanimously elected.

The Proceedings then terminated with a vote of thanks to the Chair.

(Signed) T. S. GILLATT,
Chairman.
(„) C. E. ABBOTT,
Honorary Secretary.

Nilgiri Planters' Association.

At a General Meeting of the Nilgiri Planters' Association held at the Armoury, Ootacamund, on Thursday, the 14th November, 1912.

PRESENT.—Messrs. E. F. Barber (in the Chair), J. S, Nicolls (Honorary Secretary), W. Rhodes James, E. Hardy, J. H. Pascoe, C. H. Brock, C. Gray, J. Aird, G. Oakes, A. K. W. Downing, S. Bayley, L. L. Porter, R. Stanes, W. A. Cherry, W. Deane. *Visitor*:—Messrs. E. H. Jones, Deputy Superintendent of Police, N. Hornsby, and D. Elkington.

43. *Proceedings of the last meeting* were confirmed.

44. *Rebort of the Delegates to the U. P. A. S. I. Meeting.*—The following report was read:—

U. P. A. S. I. Delegates' Report.

As your Delegates we attended the Annual Meeting of the United Planters' Association of S. India held at Bangalore on 12th, 13th, 14th and 15th August 1912.

The Annual Report was what could only have been expected, a very brief summary of the work done during the year, the new Secretary only having taken over charge a few days previous to the meeting.

The Chairman's opening speech was tactful and to the point and his re-election as Chairman for the second year in succession was proof that the Delegates appreciated the way he had faced and overcome trying difficulties. Mr. Abbott has now been elected Chairman three times. Mr. Romilly being the only other member of our community who has had a similar honour conferred on him by his brother planters.

Planting Member.—Mr. Hamilton was unfortunately unable to be present.

We do not think it is necessary to write a lengthy report. A considerable amount of the proceedings have appeared in the daily papers and the Annual Book of Proceedings has been already published.

Scientific Officer's Report.—You will have read Mr. Anstead's summary of work done during the year. It was agreed upon that his programme for 1912-1913 should be in accordance with the resolution carried last year. There was considerable discussion on certain matters of interest; especially we should mention that under the head of "Fertilizers, Coffee Pulp and Composts," Mr. Brock, one of your Delegates, proposed a resolution that Mr. Anstead be requested to carry out further experiments on the same line which was carried.

Verification of Manure Analysis.—The Scientific Department will now undertake this. We would suggest that the samples be sent through your Association and that the results be made known to all members of your Association. It would not be necessary to send up more than one sample of any one manure.

Planters' Chronicle.—We voted according to your instructions that this should be continued as a weekly paper.

Bulletins.—We voted for Mr. Plowden's resolution.

Telegraphs.—The matter of cheaper construction for lines to planting districts was considered and the outcome of the resolution passed at the meeting is published in the current number of the *Planters' Chronicle.*

That the Telegraph Department have under consideration a scheme for reducing the cost of Branch Telegraph lines, will be of interest to members who cannot get a line without a guarantee.

Coffee Hybridisation.—There was no lengthy discussion on this matter which we regret, as it is a matter of particular interest to a great number of the members of your Association. The Committee of your Association are ably looking after your interests as regards the Experimental Plot on the Nilgiris. They will no doubt have accumulated many points of interest befor the next Annual Meeting of the U. P. A. S. I.

The Indian Tea Cess.—A resolution was put by the Chair that the cess be renewed for another five years and was carried unanimously. Mr. Jackson spoke very much to the point. There is no doubt that the Fund has done good work and may be expected to continue doing so. We have been assured by prominent promoters of our industry that years of plenty lie before us. If so we shall not feel the small amount we contribute out of our prosperity.

Export duty on Bones.—This matter was ably dealt with by Mr. Barber and it is one he does not mean to lose sight of. He has enormous obstacles in front of him, but they are not likely to frighten him.

Labour enticement, Recruiting and Emigration.—This is a matter you have had much before you of late. There is little doubt that there is a growing opinion amongst Associations that labour matters are not receiving sufficient attention. We would remark that without ample labour it will be impossible to derive full benefit from the Scientific Department. Mr. Hughes and Mr. Hamilton both gave instances of inducements that were being made by "The Federated Malay States," and "The Government of Zanzibar" to emigrants. We know that Ceylon recognizes the position by the ever increasing number of its recruiters. It is time we tried to fortify our own position and not rest content to see coolies emigrating from districts from where we have in past years looked for labourers. Ceylon has found that its old recruiting grounds cannot supply its ever-increasing demands, and it now has well-organized agencies in the midst of those districts which we once thought were our own—and even more—their agencies are even sitting on our door steps. A Scheme of Registration was put before the Meeting. A Sub-Committee was appointed to receive the opinion of the various Associations to try and harmonize this into a workable scheme. We fear they have a hard task in front of them. It may be impossible to present a scheme which would be unanimously adopted; but let us make a commencement.

Non-Service of Warrants.— Mr. Brock put this before the meeting and his resolution was carried, the Anamalais voting with us. The Wynaad voted against the resolution, because they got hand warrants without any restriction. It seems a pity that the same Act should be worked under different conditions.

Election of Office-Bearers.—The election of Office-Bearers we think a wise selection. The election of Mr. Abbott as Chairman was a most popular one. We also voted for Mr. Barber as Planting Member, which was in accordance with the voting of members relative to the Circular sent to all members of your Association by your Honorary Secretary.

Proposed by Mr. W. Deane and seconded by Mr. L. L. Porter: "That a hearty vote of thanks be passed to the Delegates, Mr. C. H. Brock, Mr. E. F. Barber and Mr. J. S. Nicolls, for their services and that the report be printed in the proceedings."—Carried unanimously.

45. *U. P. A. S. I. Circulars.*—Laid on the table.

46. *Act I of* 1903.—Read High Court ruling Criminal Revision Case No. 462 of 1911 in reference to case No. 83 of 1911, No. 418 of 1911 on the file of the Stationary Sub-Magistrate, Coonoor – showing that a contract entered into with any person to perform a special agricultural work (in this instance weeding) falls under Act I of 1903 and not under Act 13 of 1859 and not as understood in G. O. No. 558, dated 28th March, 1906.—Recorded.

Honorary Secretary's letter to the District Magistrate with reference to C. C. No. 918 of 1911 (No. 25 of meeting held on 30th May 1912 and No. 37 of meeting held on 18th July 1912), and the District Magistrate's reply No. 510 M. of 1912 dated 17th Ausust 1912.—Recorded.

47. *Non-Service of Warrants.*—Read Honorary Secretary's letter dated 24th July 1912 to the Inspector-General of Police, with the latter's reply, dated 5th August 1912.—Recorded.

G. O. No. 1315 was laid on the table. Read letter No. 581 M. of 1912 dated 24th September 1912, from the District Magistrate enclosing instructions to Taluq Magistrates. Recorded.

Read U. P. A. S. I. Circular No. 38 dated 12th November 1912.– Recorded.

Proposed by Mr, W. Deane and seconded by Mr. A. K. W. Downing: "That the Honorary Secretary be instructed to ask Government to have all G. O's, that affect the Planting industry printed in English in the Nilgiri District Gazette."—Carried.

48. *Recruiting.*—Read U. P. A. S. I. Chairman's last letter to the Ceylon Labour Commissioner in continuation of correspondence published in the *Planters' Chronicle*.

49. *Registration.*—Read Mr. Porter's letter, dated 18th October, 1912, Mr. Rhodes James letter. dated 6th November 1912, Mr. A. G. Nicholson's letter dated 28th October 1912 and Mr. R. Stanes' letter dated 16th October 1912 with others. After a long discussion the following resolution was proposed by Mr. Rhodes James and seconded by Mr. W. A. Cherry:— "That this Meeting thinks that the views of the other District Associations should, if possible, be unified into the simplest scheme considered workable, that this be put before Government by the U. P. A. S. I., to ascertain their views on the subject as it is fully recognised that this labour problem must be faced and dealt with through the U. P. A. S. I."—Carried.

50. *Roads and Communications.*—The following resolution was proposed by Mr. R. Stanes and seconded by Mr. W. Deane:—" In view of the toll-gate recently erected on the Kartary road, the planting members of the District Board be asked to represent to the Board the unsatisfactory state of the road from the Kattary road toll-gate to the Droog, passing through Glenmore, Glendale and other estates, which estates are willing to render assistance in the matter of road margin and in facilities for collecting materials."—Carried.

51. *District Board Membership.*—Proposed by Mr. C. H. Brock and seconded by Mr. S. Bayley: "That the Honorary Secretary be instructed to write to the President District Board calling his attention to the District Board resolution No. 11, dated 4th September 1910 and request that all members of the District Board shall be proposed or nominated by the Nilgiri Planters' Association."—Carried.

52. *Experimental Plot.*—Mr. Gray addressed the meeting about the piece of land granted by Government and the method of work being carried out.

53. *Railway Freight.*—In reference to No. 39 of meeting held on the 18th July 1912.— Read Honorary Secretary's letter of 24th July to the General Traffic Manager of the S. I. Railway and the latter's reply to same, dated 16th August 1912.—Recorded.

Proposed from the Chair.—That the matter of reduction of railage on Tea seed be referred to the Indian Tea Association through the U.P.A.S.I.

54. *Cattle Permits.*—In reference to No. 41 of meeting held on the 18th July 1912.—Read Honorary Secretary's letter of 24th July 1912 to the District Forest Officer and the latter's reply to same, dated 9th November 1912.—Considered satisfactory and recorded.

55. *Burial Ground.*—Lease to be held and renewed by the Nilgiri Planters' Association.

56. *Scientific Department.*—Read Mr. Anstead's letter of 29th August and the Honorary Secretary's reply of 31st August 1912. Members were requested to inform the Honorary Secretary as soon as possible if they wish to have samples of fertilisers analysed.

57. *Planters' Benevolent Fund.*—Mr. Morrison's case.—Read and recorded correspondence.

58. *New Member.*—Mr. Hedde,—Proposed by Mr. E. F. Barber and seconded by Mr. J. S. Nicolls, was duly elected.

59. *The late Mr. Edminston.*—The Honorary Secretary was instructed to write to Mrs. Edminston expressing the Association's deepest sympathy in her loss. Mr. Edminston was a well-known and honoured member of our community for many years, a member and Honorary Secretary of this Association, a keen sportsman and good friend. His death will be sadly felt by those to whom he was known.

Votes of thanks to the Chair and the O. C. Nilgiri Volunteers for the use of the room terminated the proceedings.

(Signed) E. F. BARBER, *Chairman.*
(„) J. S. NICOLLS, *Hony. Secretary.*

60. Election of additional member in the planting interest to the Legislative Council of the Government of Fort St. George.—

Mr. R. Stanes occupied the Chair

Mr. E. F. Barber was elected unanimously.

(Signed) R. STANES, *Chairman.*
(„) J. S. NICOLLS, *Hony. Secretary.*

Papers on Table.—Year Book of the Planters' Association of Ceylon, Bulletin of the Bureau of Economic and Social Intelligence, Vol. 1 to 3, Bulletin of the Bureau of Agricultural Intelligence of Plant Diseases, Vol. 4 to 6; Leaflet Nos. 1 to 3, Agricultural Department, Madras; Report on the Flax experiments 1911-12. Third report on the Introduction of Improvements into Indian Agriculture. The cultivation of lac in the plains of India. Directions of the cultivation of Eri silk. Memoirs of Dept. of Agriculture Vol. 2 to 6. Advertisement in the United States No. 96 and 127 T. C. Book of Proceedings of the U. P. A. S. I. Meeting 1912.

LABOUR.

I understand the Emigration Agent for the differrent Crown Colonies are experiencing great difficulties just now in recruiting labourers for their respective governments notwithstanding that their requirements are so much less than they were a few years ago. The Hon'ble Mr. Gokhale has, I understand, been trying his best to get the Government of India to insert in the articles of indenture, to which the labourers have to subscribe, particulars of the penalties to which they are liable in the country to which they may go. It seems to me only fair that the emigrant should know what he is letting himself in for before he finally agrees to emigrate. I am told on good authority, that in Fiji the Indian labourer is treated with very little consideration and is severely punished for the most trivial offence.—*Commerce.*

THE SCIENTIFIC DEPARTMENT, U.P.A.S.I.

Ceará Rubber.—The following cutting from the *Evening Standard* of 1st November has been kindly forwarded to me from a correspondent at home.

"A new and somewhat serious disease has been found attacking the Ceará Rubber trees in Brazil. It is characterised by the production of large swellings on the twigs and branches, often four times the diameter of the branch attacked, and most of the swellings give rise to a number of young shoots, which in some cases form "witches' brooms." The cause of the trouble is a rust fungus originally discovered on wild manihot trees in Brazil in 1892. The disease is somewhat wide spread in Ceará. When trees are attacked by it the flow of latex diminishes, the diseased branches drop off, and death follows. Countries importing seeds from Ceará should insist on disinfection."

This once more emphasises the necessity for world-wide legislation to check the possibility of importing plant diseases from one country into another. These particular diseases are little understood and most difficult to control, familiar instances being the witches broom' disease, which did so much harm to cacao some years ago in Surinam, and the 'spike disease' of sandal in Southern India.

Wounds in Trees.—An instructive article from the pen of Mr. W. J. Bean appeared in a recent number of the *Kew Bulletin* in which it was pointed out that hollow places in the trunks and limbs of trees formed by decay are better filled up. If the cavity is small and properly treated decay is often arrested and new bark encouraged to grow over the filled up cavity. This prevents the entrance and accumulation of moisture and thereby removes one of the chief predisposing conditions of decay. The author says:—"The majority of such decayed hollows have their origin in snags left by branches broken off that have rotted back into the trunk because the new bark has not been able to grow over and heal up the wound. Branches removed by design or broken off by wind or accident should always be sawn off close to the trunk, and the sawn surface should then be coated over with ordinary coal tar. If a snag or stump is left the bark cannot grow over it; damp, fungoid parasites and decay sooner or later follow and gradually find their way towards and eventually into the trunk."

This is especially important in the case of Rubber trees, but it is also worth while attending to wounds in Coffee both when it is topped and when it is stumped. I have often found on splitting open the stem of a dying or sickly Coffee tree that it is not only bored but the centre is decayed and stained from the effect of an old wound made many years before but still open. Such decay results in a kind of "blood poisoning" which keeps the tree in an unhealthy condition. During a recent visit to Coorg I was shown the results obtained with Jodelite as a preservative for wounds and this proves much better in every way than Coal tar. It resembles the Rosin Oil which I recommended some years ago but failed to be able to get in India. Further information on the subject of the treatment of wounds in trees will be found in the *Planters' Chronicle*, Vol. IV, p. 281, Vol. V, p. 71, 501, Vol. VI, p. 763.

R. D. A.

INSECT NOTES.

Plant Protection in the United States.

The information given below is copies from Circular No. 37. from the Office of the Secretary of the United States Department of Agriculture and is presented herewith as likely to be of interest to readers of *The Agricultural News*. The Circular includes an introduction and the development of points under four headings ; the introduction and the first of these parts are given herewith. The West Indian Colonies are equipped with legislative enactments by means of which it is sought to prevent the introduction of pests and diseases along with imported plants. The instances quoted as illustrations of the conditions calling for legislation can hardly fail to impress the mind of the reader with the importance of these imported pests and the necessity for preventing the introduction of additional forms with similar capacity for harm.

Introduction.—The effort to secure national legislation to keep out new and dangerous insect pests or plant diseases which may be brought in with imported nursery stock has been actively favoured by the Department of Agriculture, just as the department in the past has promoted and secured legislation enabling it to exclude from this country diseased animals or to quarantine and stamp out animal diseases whenever such have appeared. In the case of domestic animals, the exercise of these powers has brought enormous benefit and has worked entirely satisfactorily to the live-stock industry. It is reasonable to befieve that like benefits to fruit and forest interests, included the nursery business, will undoubtedly come from similar legislation to exclude insect pests and plant diseases.

The mere statement is sufficient to show the need, but a strong concerted effort is being made to array the nursery trade of this country against such legislation and put this important industry in the very unfair attitude of opposing reasonable legislation, which is quite as much for its own protection as of the evident misunderstanding which is being broadly circulated in relation to the intent of the proposed act and of its probable manner of enforcement, and the groundless fear that the Secretary of Agriculture or his experts would take an unreasonable attitude towards the nurserymen. It seems desirable to make a fair statement (1) of the conditions calling for such legislation, (2) the history of the efforts to secure it, (3) an explanation of the scope and working of the Bill now before Congress, and (4) the relation of the Secretary of Agriculture and his assistants to the enforcements of such a measure.

Conditions calling for Legislation.—Practically all of the European powers have very stringent plant inspection laws, and, in the case of the United States, absolutely prohibit the entry of nursery stock. Apples and other American fruits are admitted only when the most rigid examination shows freedom from insect infestation. Canada and other important British possessions have similar protective legislation.

The United States is the only great power without protection from the importation of insect infested or diseased plants, and thus becomes a sort of dumping ground for European refuse nursery and ornamental stock. This does not often apply to the importations of the larger and reputable importing firms, but does apply to the poorly packed miscellaneous ornamental and other stock imported by department stores of large cities or that sent to this country to be sold under the hammer by auctioneers for whatever price may be obtained.

The immediate danger which led to the recent effort to secure legislation was the discovery in 1909 of the abundant importation and wide distribution into the United States of nursery stock infested with brown-tail moth nests and occasional egg masses of the gipsy moth. During the years 1909 and 1910 such infested stock was carried into twenty-two states, covering the country from the Atlantic seaboard to the Rocky Mountains. During the first of these years no less than 7,000 winter nests of the brown-tail moth, containing approximately 3,000,000 larvae, were found in shipments into New York State alone—seed material enough to infest the whole United States within a few years. During the second of these years, 617 of these nests were found on nursery stock shipped into the State of Ohio, and a much larger number, approximately the same as the year previous, were again sent into New York. Smaller numbers of these nests, proportioned to the amount of nursery stock received, were sent into other States east of the Rocky Mountains during both of these years. Fewer brown-tail moth nests were received during the season just ended (1910-11) owing to the agitation in this country and more strict supervision by foreign Governments. These winter nests are, however, still coming in, and the danger is now perhaps even greater, for the reason that as infestation becomes more infrequent a laxity of examination is likely to result.

So far as possible, this stock, as voluntarily reported by Customs officers and railroads, has been examined and the brown-tail nests removed or destroyed by state authorities, or, where these were not available, by agents of the Bureau of Entomology of the United States Department of Agriculture. Undoubtedly many shipments have not been reported or examined, and it is quite probable that local infestation has already started at different interior points. The history of both the gipsy and brown-tail moths in New England shows that these insects may be present for several years without being noticed, slowly gain headway, and then suddenly develop their full power of destructiveness.

It is scarcely necessary to comment on the danger to this country from the careless introduction and wide distribution of these two orchard and forest pests. In a limited district in New England more than a million dollars a year has been spent for a long period in a mere effort to control these two insects, and the General Government is now appropriating $300,000 annually to endeavour to clear them from the border of main highways and thus check their spread. These expenditures do not take into account the actual damage done, but they do serve as a measure of the danger to the whole country from the recent distribution of these two insects on imported nursery stock.

As further illustrations of the constant risk from lack of legislation may be mentioned two very recently introduced insects which will undoubtedly prove very expensive pests in future years. The European alfalfa leaf weevil, on the authority of the Entomologist of the Utah Experiment Station, Mr. Titus, was probably brought into Utah in packing of nursery stock or other merchandise from Europe. This leaf weevil has already destroyed much of the value of the important alfalfa crop of Utah, and is spreading into adjacent states. The other illustration is the oriental cotton scale (*pulvinaria psidii*), probably the worst scale pest of citrus and other sub-tropical plants in Southern Asia. This scale insect has recently been introduced into Florida on imported stock and is already well established there.

New plant diseases, against the entrance of which there is at present no bar, may even more seriously jeopardise the farm, orchard, and forest products of this country. Imported potatoes from Newfoundland are now bringing in the potato wart disease, which, wherever it has been introduced in Europe, and also in Newfoundland, puts a stop to potato culture. The importation of white pine seedlings is now bringing in the European white pine rush, which, if established and disseminated, will destroy much of the value of our white pine forests. Absolute quarantine against these two plant diseases is the only means of keeping them out. The chestnut disease, now practically shown to have been introduced on trees imported from Japan, illustrates what may quickly happen from such unchecked introductions.

More than half of the important insect enemies and plant diseases now established in this country have been brought in on imported nursery stock, and new insect enemies and new diseases are being thus introduced every year. Twenty different insect pests, new to this country, some of them very formidable in the Old World, have been intercepted in the inspections of the imported material by this department this year, and this does not include the introduction of brown-tail moth nests and other European pests with imported seedling stock.

A properly enforced quarantine and inspection law in the past would have excluded many, if not most, of the foreign insect enemies and plant diseases which are now levying an enormous anuual tax amounting to several hundred million dollars on the products of the farms and orchards of this country.

In spite of the many pests which have already gained foothold and the control of which will be a permanent annual charge on production there remain many other insect pests and plant diseases with equal capacity for harm which, fortunately, have not yet come to us, and it is to protect from these new dangers that legislation is now sought, not with the intention of prohibiting the trade in imported stock, but to throw such safeguards around it as will most protect both the importers and the subsequent purchasers of such stock.

The insect pests and plant diseases that have come in are probably here for all time, but certainly no reasonable objection can be made to the effort to safeguard the future. The conscientious importer will be benefitted, and the home producers, the dealers, and all the great fruit and forest interests will be protected by suitable inspection and quarantine legislation.—*The Agricultural News.*

STINGLESS BEES (?) ETC.

The clipping below seems to have seen having the run of the daily papers. We clip it from the *Detroit News* of Oct. 1:

The stingless bee has at last arrived, having been produced by an English apiarist named Burrows after two years of experiment. A description of the new bee, which has been received here, says that the hybrids are splendid workers, and are less liable to disease than the ordinary honey-producers. Burrows mated Cyprian drones with Italian Queens to produce the new bee, which, while possessing a stinger, can notuse it as a weapon of offence.

Something like twenty years ago, when D. A. Jones brought the first Cyprian bees from Cyprus, the same or a similar claim was made, and there was just a grain of truth in it. The Cyprians, or a cross such as mentioned, seemed quite slow about getting on the "war-path;" but it soon transpired that, when once roused up, say by untimely meddling, they stung worse than any other bees we had. So much for newspaper canards—A. I. R.—*Gleanings in Bee Culture.*

SOILS.

The Practical value of Soil Analysis.

When soil analysis is mentioned, it is usually understood that an *investigation and statement of the chemical and physical constitution of the* soil are intended. *In the part of the statement relating to the chemical* investigation, first attention is paid to the content of the soil in more or less available compounds containing nitrogen, potash and phosphorus; while the information relating to the physical condition ot the soil is concerned chiefly with the proportions that it contains of particles of different sizes, and with the quantities of these that, speaking broadly, are of a sandy or clayey nature. If all this information is properly understood and applied with a correct regard to its limitations, it is of the greatest use to the agriculturist. If it is thought to provide an absolute indication of the degree of fertility of the soil, and to show necessarily the plant food constituents that the soil lacks, its provision may be of little avail, and actually harmful.

A recent discussion of the correctness of the view that the analysis of a soil gives a ready means of obtaining an indication of its fertility, and of determining its manurial requirements, deserves notice here in the light of conditions and experience in the West Indies. First attention may be directed to the question—'to what extent does an analysis of a soil give an indication of that soil's fertility ?'

The fertility of a soil is measured by its power to grow crops, and this power is most obviously limited by its ability to supply the plant food requirements mentioned already. It is not sufficient, nevertheless, for the soil merely to contain these bodies in adequate amounts. One matter of the greatest importance is that there shall be an ample provision of water to be taken up by the roots, and there are other essentials, such as proper aeration of the soil. It is not the purpose of this article to discuss these, it is only expedient to point out that insufficiency in any one of them prevents the proper use by the plant of all the others. Their useful provision depends, in turn, on such factors as climate, exposure and depth of soil, and drainage. The chief limitation to soil analysis is that these factors, obviously, cannot be determined in the laboratory. Even when they are known to the analyst and he is able to correlate them with the results of his investigation of the soil itself, they are quite insufficient to determine the fertility of any given area. They must be supplemented by the local knowledge, experience and judgment of one, such as a planter or investigator, who may be said to be agriculturally familiar with that area.

The difficulty does not end here, for the analyst up to the present is not able to give any complete information as to the availability of the food bodies in the soil: this may contain nitrogen, phosphates and potash in amounts that are far greater than those required by plants, but one or more of these bodies may be unavailable or locked up as regards immediate needs, to such an extent that the soil is actually lese fertile than one containing them in much smaller amounts but presenting them in forms that are easily taken up by plants. This is the reason why a soil showing lack of fertility will often readily respond to small dressings of certain manures. Such a soil is amenable to treatment other than manuring; it requires that the plant food in it shall be made to become available at a greater rate, and good cultivation, draining and liming are partial means to this end.

In this consideration regarding availability of plant food in the soil, it must not be forgotten that methods have been devised with the object of ascertaining roughly the amount of certain soil constituents ready for direct use by the plant; an example is the determination of the proportion of the phosphates soluble in weak citric acid.

This is useful for obtaining broad indications of what is wanted in certain directions as regards manuring, as well as for comparing soils of the same kind. The serious limitation of such methods is that they do not include a ready means of finding the availability of the chief forms in which nitrogen—the most important of plant food elements—usually exists in soils.

More directly useful results are afforded by the second kind of analysis of soils, under discussion, which is the physical or mechanical analysis. In most cases this gives a means of estimating approximately such matters as the power of the soil to retain water, the ease with which water drains away from it, and its ability to withstand drought; it may even supply indications as to the best methods of cultivation of the soil. Conditions in the tropics nevertheless render the humus content of the soil of such paramount importance regarding its permeability, water capacity and drainage that this factor has to be considered very seriously when interpretation is being given to the results of physical analysis. If this is remembered, these may be used in a most valuable way by the planter and other agriculturists.

A further complication of the matter is that the results of analysis of the chemical and physical conditions of the soil do not enable much to be inferred concerning its biological conditions. These papers have been often employed recently to explain and emphasize the importance of the modern conception of the work of bacteria in the soil. It is here that the physical analysis again shows its usefulness, provided that its results are interpreted in the light of knowledge mainly concerning the water and lime content of the soil, and regarding its aeration. To make the matter plain, it is only necessary to contrast the nitrification and maintained fertility in an open soil, with an efficient water-supply, with the loss of nitrogen and non-productiveness in a waterlogged clay soil.

It can be concluded from these matters that, while their proper employment may be most useful, chemical and physical analyses of the soil—especially the former kind of investigation—are rarely capable by themselves of providing direct conclusions regarding fertility in a particular area. Their main use, in a broad way, is for supplying material in such work as a soil survey, by which the soils of a country may be usefully classified so that general predictions as to the manurial requirements of these may be made. They can never replace the simple field experiment as a means of ascertaining the suitability of a given area of soil for raising any crop that is intended to cultivate on that area.—*The Agricultural News.*

Soil Fertility.

The term "Soil Fertility" cannot be said to have any definite significance, since it can only be employed to denote a relative condition. For instance, a virgin soil with only a very small proportion of available plant food may, through the activity of bacterial life present in it, be highly nitrified and fertile; and yet it will become useless after a couple of crops have been taken off it. An analysis, to be of value, should indicate the total amount of mineral plant food in the soil rather than the measure of fertility which depends, so to speak, on accidental and variable circumstances, and is obtainable without any great difficulty by artificial means.

The hydrochloric acid method of soil analysis is useful in this respect, in that while it gives no true indication of immediate fertility, it is a guide to the total reserve of plant food which can be made available through a comparatively long space of time.

The difficulty in ascertaining the immediate fertility of a soil is in discovering the solvent which most nearly approaches the action of plant roots. There is present in most soils a certain proportion of plant food that may be said to be ready for root absorption, but the bulk of it awaits the solvent action of the roots.

Different chemical compounds respond differently to a particular solvent agent. and different agents act differently on a particular chemical compound. This is a common experience in the use of re-agents in the laboratory.

The action of carbonic acid and other solvent substances present in soil water is sufficient to bring about the solution of certain compounds, bui not of others. The solutions of the former that are found in the soil will be available to plants, but compounds of the latter type demand the action of what is known as the "acid sap" of the roots.

If the exact composition of this acid sap were ascertainable there would be no difficulty in imitating its action in the laboratory and so discovering the so-called "soluble plant food" in the soil.

There is good reason to believe that the acid sap of plants is not of uniform composition, that is to say that it is not of the same character in the case of all plants; and this fact serves to complicate the work of chemical analysis made with the object of ascertaining the proportion of soluble plant food or determining the measure of immediate fertility. The action of strong acid such as hydrochloric acid can in no way be compared to the action of plant roots. A proper soil map should not be based on considerations of immediate fertility, since as already pointed out, many soils may be very fertile for a short time only and then become exhausted. Closely connected with the question of fertility are the mechanical character of soils and the meteorological conditions prevailing in the districts in which they occur; but the element which has the most important bearing on this question is the biological relations that exist in the soil.

These considerations have been forced upon us by a perusal of a valuable paper by Dr. Jensen of the N. S. W. Department of Agriculture. Himself a chemist, the author fearlessly states that though he at one time expressed a belief that chemical analysis of soils would be of direct value to the agriculturist, subsequent research has convinced him that he was wrong. In certain cases an analysis is of help to the expert, but in the generality of cases instead of being a guide to the person who is in quest of a suitable manure for his crop, it is a delusion leading him to useless expenditure. Many soils which are low in lime and potash are really rich soils, and many others which are apparently rich need manure badly.

Soil analysis by the official method while misleading to the layman has, however, this advantage, that when analytical results are considered carefully in conjunction with such matters as depth of soil, mechanical condition, climate, topography, &c., it aids in judging of the potential fertility of soils. But it is only an aid, and it is very often the case that without it an experienced person is able to pronounce an opinion, after a few minutes' inspection and manipulation of the soil, more definite and correct than that expressed after a complete and tedious chemical analysis.—*The Tropical Agriculturist.*

RUBBER.

Use of Ammonia or Carbonate of Soda in Tapping Hevea.

The following digest of a paper by W. Lucas published in the *Bulletin de l'Association des Planters de Caoutchouc*, Vol.IV, p.206, is reproduced from the *Bulletin of the Bureau of Agricultural Intelligence and of Plant Diseases* for September.

The quantity of scrap formed by the coagulation of the latex on the trees being considerable, as compared with the quantity of rubber resulting from the coagulation of the latex in the works, the difference in price between these two qualities has led the Author to make various experiments with the object of reducing the quantity of scrap. The same applies to the "lump" or rubber resulting from the partial coagulation of latex in the cups or during transport, a coagulation due to heat and jolting.

The coagulation of the latex being promoted in an acid medium, the question was to keep the latex in a sufficiently alkaline medium to prevent partial coagulation taking place too quickly, whilst avoiding a degree of alkalinity which would too greatly retard the subsequent coagulation at the factory and require the use of too great an excess of acid. After various trials carried out on 150 trees, the Author decided in favour of using the following solution: 30 cc. of ammonia (17% of gaseous ammonia) and 970 cc. of water. Each coolie received 1 litre (1¾ pint) of this solution per 150 trees, representing an average of 332 incisions. The trees were tapped daily with half-herringbone cuts. The experiments were continued during a month on more than 5,000 trees, one half of which were tapped as usual, that is to say using ordinary water to facilitate the flow of the latex, whilst for the other half, water with ammonia added was employed. Under these conditions the quantity of scrap coming from the trees for which water alone was used was 50% greater than that from the trees for which ammonia was employed. The method of use of the ammoniacal solution is as follows: the coolie is provided with a piece of rotang about 8 in. long and ⅛ in. in diameter, one end of which he beats so as to crush the fibres and turn it into a sort of brush. With this brush the coolie wets the vertical outlet channel and then makes 1, 2 or 3 incisions according to the tree, so as to have the half-herringbone on his right, if it has been made from left to right, or on his left if made from right to left. He then takes away a part of the liquid with his brush, applies it against the tree, a little above the top of the herringbone, and presses out the liquid with his finger. This is done 2 or 3 times in succession for each such out. Taking up his position behind the tree, the coolie can very well guide the outflow of the liquid, which follows the flow of latex, without anything dripping on the tree. This entire operation occupied an exceedingly short space of time.

With regard to the lump, it can be reduced by adding 1.6 cc. of ammonia (17% of ammonia gas) per litre of water in the vessels into which the latex flows. The quantity, which was about 240 grams of dry lump for 150 trees, was reduced by one half by the use of the ammoniacal solution on the tree alone and to 3 to 14 gr. when this solution was used on the tree and in the cups.

As regards coagulation, 0.7 cc. of acetic acid (98% strength) was used per litre of diluted latex when ammonia was not employed; under these conditions coagulation began straightway upon the addition of the acetic acid and the coagulum was removed on the expiry of 20 minutes. By using the ammoniacal solution on the tree alone, the quantity of acetic acid employed was the same as that indicated above, but coagulation took place more slowly and the coagulum was only taken away after 30 minutes. As a consequence of using the ammoniacal solution on the tree and in the cups, the quantity of acetic acid needed was 1,3 cc. per litre of dilute latex and the coagulum was also removed after 3 minutes. From the foregoing it results that scrap and lump are substantially reduced by employing ammonia and that consequently the quantity of rubber prepared in the factory is increased by the same amount. Besides this, as the ammonia retards the formation of scrap (which chokes up the laticiferous vessels and contributes to stopping the flow of latex), it cannot be otherwise than favourable to the yield.

The Author found that ammonia possesses in addition the following advantages:—

1. The straining of the latex is much easier than if water alone is used, in which case the meshes of the strainer are quickly choked up, which necessitates frequent cleaning.

2. The impurities passing through the strainer fall more easily to the bottom of the vessel in which the coagulation is carried out, while they remain in suspension if coagulation has already begun.

In consequence of the comparative high price of ammonia, the author made experiments with carbonate of soda, which gave results just as good, but do not yet allow of indicating figures and must be continued on a basis of comparison with ammonia.

TEA.

There is no doubt that the present tendency of tea companies is to pay more attention to the production of quantity than of quality, and the result of this year's working may open our eyes to the danger of this policy. In this connection the remark of Messrs. McMeekin & Co., in their weekly report reproduced in "Capital" last week, is very much to the point. "It might be well for growers generally to turn their attention more closely to the manufacturing processes and to produce rather less tea of more selective quality."—*Capital.*

The four largest producing countries in the world, India, Ceylon, China, and Java, are increasing their output at an enormous rate every year, and the consuming population, though increasing, is doing so at a slow pace. The upshot will be that in a short time, if the present rate of production is kept up, there will be more tea than there will be a profitable market for. I have even heard it said that there will be more tea than there will be people to drink it, but I can hardly admit that, as there are thousands of people now who would drink more tea than they do if they could only afford it. The result of this great output will be a cheapening of the article to such an extent that it will be unprofitable to grow it, and I have little doubt that some estates are finding that out even now. Another result may be that poor companies will throw up the sponge, and that large producing areas will be abandoned, this allowing supply and demand to again reach the right level. This has happened before, when things were not pushed to the pitch they are to-day, and when it happens again it will mean nothing less than ruin to a considerable part of the industry.—*Capital.*

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DISTRICT PLANTERS' ASSOCIATIONS.

Mundakayam Rubber Planters' Association.

Minutes of the General Quarterly Meeting of the Mundakayam Rubber Planters' Association held at Yendayar Bungalow, on November 2nd, 1912, at 10 a. m.

PRESENT.—Messrs. J. R. Vincent (Chairman), G. H. Danvers Davy (Vice-Chairman), V. R. Bates, R. A. Fraser, C. M. Hunnybun, H. M. E. Howson, R. Harley, Ashton Hamond, H. B. Kirk, J. J. Murphy, H. O'Reily, W. P. Rogers, Malcolm Smith, E. B. Tapsell, A. C. Vincent, and Edwin Vincent (Honorary Secretary). *Visitors.*—Messrs. A. W. L. Vernede, J. A. Richardson, T. C. Forbes, Mackenzie and Standen.

The Chairman at the outset proposed a vote of condolence with the family of the late Mr. Fred. H. Hall, which was passed, all members standing.

The Honorary Secretary also read letters of sympathy from the Malabar Coast Planters' Association and Messrs. Peirce, Leslie & Co.

The Chairman then welcomed the visitors.

Business:—

(1.) *Minutes.*—The minutes of the last meeting were taken as read.

(2.) *Report of the Bangalore Delegate.*—Mr. G. H. Danvers Davy said:—

" Mr. Chairman and Gentlemen,—My representation as delegate, from Mundakayam, except in name was,—I am afraid—a very poor one. I had no resolutions to bring forward and so in most cases voted with the majority.

" Your instructions were carried out to the best of my ability and if any of the subjects specially brought forward by you in your instructions, were not brought up by me, my only excuse is that these headings were far more ably dealt with by other delegates.

" I, as your representative, was in a far happier position than most of the other delegates in South India. Most of them had their own troubles and worries and although discussion on the various subjects will not be found in print, this is owing to the leniency of the Chairman who allowed us to discuss these matters in Committee for which most of the delegates were heartily grateful—yet they were most exhaustively thrashed out.

"According to your wishes I followed your instructions regarding the following headings on the U. P. A. S. I. agenda.

"No. 7 a. No. 8 and No. 9.—As regards No. 9 I can see no hope of Government ever levying an export duty on Bones. Revenue to the Government from this source alone means a very big sum which it has no desire to lose. Australia and Ceylon have been enormous buyers of bone manure but the former country has now made it prohibitive to import bones. The reason of this is the introduction of foot and mouth disease and many other diseases common to cattle in India and if we can induce Ceylon to look on it in the same light as Australia so much the better for us.

"No. 11. *Tea Cess.*—The question of the renewal of the Cess was gone into, the general opinion was that this Cess should be continued for another five years.

"No. 13. *International Rubber Exhibition.*—As regards the disposal of the funds, the Chairman explained that he had written to the Madras Government desiring them to express their views as to how the money unspent at the London Exhibition of 1911 should be dealt with. The Madras Government in reply expressed their desire to have it refunded. Accordingly the balance of funds given by Madras and Travancore were sent back to the respective donors.

"No. 14. *Labour.*—This subject was discussed most exhaustively. The matter of recruiting and emigration was brought up by Messrs. Dickins and Hamilton and you have all, no doubt, read what they had to say in the Madras papers. The Ceylon papers have taken up the cudgels on behalf of the Ceylon Planters and scorn the idea of crimping by any Ceylon man. A Scheme of Registration was put before the Meeting and a Sub-Committee was appointed to receive the opinions of the various associations with a view to try and harmonize this into a workable scheme. Will they succeed—I trow not.

"This Scheme of Registration has been distributed by our Honorary Secretary and you have all doubtless thoroughly gone into it and will be in a position to express your view this morning, so that our Honorary Secretary may send up a working scheme before the next General Meeting with the idea of improving the labour position.

"As regards non-service of warrants the following scheme was suggested and carried :—

(1.) That any Magistrate issuing warrant to a kangany or maistry should notify the District Superintendent of Police of the district concerned that such a warrant has been issued.

(2.) That all "hand" warrants should also be endorsed by the District Superintendent of Police of the district in which the warrant is to be served or by his Office Manager.

(3.) That on enquiry of a planter as to the status of any particular maistry or kangany the Superintendent of Police for the district in which the maistry or kangany resides shall make enquiries as to the maistry's or kangany's standing and means, and report the same to the planter."

"With regard to the Scheme of Registration of Labour, mentioned by Mr. Davy in his report, Mr. Richardson said that the Dewan had made a suggestion that a Commission be appointed to enquire into the matter, consisting of members from the ryots, the P. W. D. and the Travancore Planters' Associations. Mr. Harley, speaking on the subject also thought that some workable scheme might be formed. Eventually the Chairman's proposal to form a Labour Committee to discuss what could best be done, was carried."

The Chairman then proposed a hearty vote of thanks to Mr. Davy, and this was seconded by Mr. Harley, Mr. Davy responding.

(3.) *Removal of the Kanjirapalli Court House.*—The recommendations of the Committee were put before the meeting, and Mr. Vernede said a proposal was on foot to have the Camp shed removed and a Court House built on the site, a new Travellers' Bungalow being erected a little further back. The members received this announcement with pleasure.

(4.) *The Scientific Officer Scheme.*—At the request of the Chairman the Honorary Secretary gave a resumé of all that had so far been done in this direction, referring particularly to the resolution passed at Yendayar on 1st July 1911, to the effect that subject to 90% of the acreage agreeing, the necessary agreements should be drawn out. The Hony. Secretary pointed out that rather more than 90% of the acreage in the district had indicated its willingness to participate in the Scheme and that with the increased acreage now under cultivation the cess would be considerably less than was hitherto thought would be the case. The actual figures were for the initial expenses a cess of 10 annas per acre or if only 90% of the acreage is agreeable 11 annas per acre. Annual estimate 9 annas per acre or if only 90% of the acreage is agreeable 10 annas per acre. The election of a Committee then took place, Messrs. G. H. Danvers Davy, R. A. Fraser and H. B. Kirk being returned, the Chairman and Honorary Secretary to be Ex-officio members. Messrs. J. J. Murphy and R. Harley kindly consented to become Trustees of the Fund.

The following resolutions were also passed after some discussion:—

1. "That the Scientific Officer be under the entire charge and control of the Mundakayam Rubber Planters' Association."

2. "That his residence should be at Mundakayam."

3. "That the Travancore Government be asked to contribute towards the cost of the Scheme."

4. "That the limits of the district in which the Scientific Officer shall work, shall be defined."

5. "That the cost of the scheme be met by an acreage basis guaranteed for a term of years on similar lines to the European Doctor Fund."

With regard to the selection of a suitable officer, Mr. J. J. Murphy proposed: "That Mr. K. E. Nicoll and Professor Wallace be asked to select a man." This was carried *nem con.*

Mr. Murphy further supported the Chairman's proposal that the Honorary Secretary be asked to call for subscriptions to be paid by January 15th, 1913. The discussion closed with a vote of thanks to Messrs. Murphy and Harley for consenting to act as Trustees.

(5) *Rubber for the Imperial Institute.*—Messrs. Murphy and Forbes were asked to judge the samples of rubber brought to the meeting by various members.

(6.) *Revision of Rules.*—In presenting the Committee's recommendations with regard to the revision of rules the resolution was first carried that the old rules, with subsequent alterations and additions be rescinded. Mr. Murphy then proposed that the Committee's recommendations be adopted *in toto* and this was carried unanimously.

(7.) *Election of Auditors.*—Messrs. H. B. Kirk and R. A. Fraser were asked to become for one year, the Auditors of the Association accounts. These gentlemen kindly consented to act in this capacity.

(8.) *Acreage Vote.*—The Chairman proposed that provision be made in the rules with regard to the acreage vote. Mr. H. B. Kirk suggested that each member be allowed one vote for every 50 acres represented by him. Mr. Murphy put forward an amendment that one vote be allowed for 100 acres only, and that fractions of over 50 acres be given a vote but that fractions of less then 50 acres be not counted. This was unanimously carried.

(9.) *Private Membership.*—The Chairman put the suggestion before the meeting that persons who were not members of the Planting Community in Mundakayam should be admitted to membership of the Association on payment of a small fee which would accord them a vote at the meetings. Mr. H. B. Kirk proposed that such members pay Rs. 10 per annum and they be accorded one vote. No dissentients.

(10.) *Sri Mulam.*—Mr. Richardson said he was under the impression that the Peermade and Mundakayam Associations were allowed to send only 1 representative for the two districts, and the Honorary Secretary was asked to write Government as to this. In the event of the Government allowing separate representations, Mr. J. R. Vincent kindly consented, after election, to represent Mundakayam at the popular Assembly. Mr. Vincent was asked to particularly bring up the question of roads.

(11.) *Labour Act of Travancore.*—Mr. J. A. Richardson addressed the meeting with regard to this Act and the Chairman proposed that he be supported by the Association in his representations to Government on the question.—Carried.

(12.) *Postal Delays.*—Mr. H. B. Kirk handed in a letter from the Mundakayam Postmaster in answer to his complaint with regard to delay in delivery of parcels. The Honorary Secretary was asked to approach the Postmaster-General with a view to accelerating the delivery in Mundakayam of postal packets, etc.

(13.) *Correspondence.*—The Hony. Secretary read the following:—

(1.) Letter from and to the Excise Commissioner with regard to Import Duties on Tobacoo. No discussion.

(2.) Letter from the British Resident and Mr. F. F. R. V. Hunt with regard to the arrest of Mr. Hamond. The Honorary Secretary was requested to approach Government and ask for proceedings in this case to be accelerated.

(3.) Letters with regard to Mr. Asher's application for repairs to the Lalam-Erutapetta Road and for the establishment of a post and telegraph Office at Erutapetta. The Honorary Secretary said that he was still in correspondence with the parties concerned on these subjects.

(4.) Letter from Mr. Anstead with regard to Fertiliser Analyses. No discussion.

(5.) Letter from the Chief Secretary to Government informing the Association that a license has now been granted to Messrs. S. P. Mel & Co., Mundakayam.

(6) Letter from the Chief Secretary to Government announcing that only one toll will be levied at the Kanjirappalli Bridge on vehicles returning through the gates within 24 hours. On this subject Mr. J. J. Murphy asked that the Honorary Secretary be requested to approach Government praying for an improved road in view of the tolls paid. Mr. Danvers- Davy seconded and the motion carried.

(7.) Letter from Mr. S. C. H. Robinson, with regard to his jurisdiction as an ordinary 1st Class Magistrate and as a Special Magistrate.

(8.) Letter from Mr. Fletcher Norton, Secretary to the U. P. A. S. I., with regard to the annual subscription. Mr. J. J. Murphy proposed that the resolution of January last be adhered to.—Carried.

(9.) *Date and Place of next Meeting.*—Under the new rule this will take place on February 1st, 1913, (Saturday). By kind invitation of Mr. Ashton Hamond the meeting will be held at Chennappara Bungalow.

The meeting terminated with a vote of thanks to the Chair on the proposition of Mr. G. H. Danvers Davy, seconded by Mr. A. C. Vincent.

South Mysore Planters' Association.

Minutes of a Special General Meeting held at the Hanbalu Travellers' Bungalow, on November 28th, 1912.

PRESENT.—Messrs. F. M. Hamilton (President), A. R. Park, W. F. Scholfield, C. K. Pittock, E. M. Davidson, D. Jackson, W. L. Crawford, Thiselton Anderson, (Honorary Member), G. N. Frattini, *Visitor*: Mr. Galliffe, Mr. M. J. Woodbridge, Honorary Secretary.

Election of Planting Member of Council Fort St. George.—The rules governing the election having been explained this Association voted unanimously for Mr. E. F. Barber.

Report of Delegate to Mysore Representative Assembly.—Mr. Crawford said that according to his instructions he had thanked the Government for the reduction of the Rubber land assessment and had asked for a similar concession on Coffee land, for those who had bought land held on 30 years tenure from others, and wished to put in on permanent tenure. He had also touched on the subject of the Mangalore Railway and assured the retiring Dewan of the high appreciation on the part of the South Mysore Planters' Association for all he had done for the welfare of Mysore.

U. P. A. Scheme of Registration by means of Finger Prints.—This subject was introduced by the President as follows :—" It has been thought best to put this on the agenda for discussion as although the U. P. A. had asked us individually to criticise the Scheme, I am sure there are many members of this Association who would like to discuss in meeting the different clauses. I hope some members have sent their views in. I am ashamed to say I have not yet done so owing to work. My views are as follows :—

As the Scheme at present does not apply to Local Labour we have to deal with Labour imported from British territory into Mysore.

1. Without an Extradition Act I don't think we can expect the Madras Government to help us in the case of Native territories.

Without Government help in the way of persons before whom advances are given any registration would be inoperative and no Government official would allow an advance of more than a man could pay off in one year.

2. Without some arrangements for settling old balances due by coolies to maistries, our maistries would not agree..

A system of Cooly Registration on Estates would not be a sufficient safeguard as most of the crimping and bolting of coolies takes place before coolies get on to the Estate. So far my views are destructive.

I will propose certain alterations in the Scheme as drawn up:—

1. "That it includes maistries and coolies.

2. That all old advances as proved by maistries, before their coolies be taken as written off ½ to the maistries and ½ to the Estate the coolies join after the Scheme comes into force."

Maistries' advances be written off ½ to themselves ½ to the Estate they join.

In the latter case, of course, Managers would try to get maistries who did not owe much old balances. It might be necessary to get managers to send in a list of all maistries who owed money to the Register Office.

Working of Scheme.—Government be asked to appoint officials before whom advances could be given and finger prints taken in every village of any size, say 50 houses.

Fees.—I would suggest that a fee of 4 as per cooly be fixed for the first year and if insufficient a call be made on each Estate joining, in proportion to the number of coolies employed. That the above fee do cover all expenses of registration, correspondence, &c. It remains for individual members of a District Association to say whether they will or will not join the Scheme as passed by the U. P. A. S. I. by this I mean it is not necessary for any planter to join who does not wish to do so even if a scheme is passed. Of course, your delegates to U. P. A. would have to get instructions as to voting."

A discussion took place and it was decided that—

(1.) It should be clearly stated that the Scheme refers both to maistries and coolies.

(2.) Cooly finger prints must be taken in the presence of persons authorized by Government.

(3.) That the Scheme can only be of use in Mysore in the absence of extradition if *in all cases* finger prints are taken and reference made to the R. O. *before* an advance is given to maistry or cooly.

(4.) In the note to Para III Scheme of Registering by Finger Prints the re-in re-registered seems to be a misprint.

(5.) The Honorary Secretary was instructed to write to the Secretary, U. P. A. that the meeting is of opinion that the Committee appointed by the U. P. A. should, as soon as possible, issue a progress report for disscussion by District Associations.

Mr. G. N. Frattini was elected as an Honorary member of the Association.

The Meeting then closed with a vote of thanks to Mr. A. R. Park for his hospitality.

(Signed) M. J. WOODBRIDGE,
Hony. Secretary, S. M. P. A.

Wynaad Planters' Association

Proceedings of a Special Meeting held at Meppadi Club, on December 4th, 1912.

PRESENT.—Messrs. Bownass, Darkin, Gillatt, Macbain, G. C. Parker, J. C. Parker, Powell and C. E. Abbott (Honorary Secretary) Mr. J. C. Parker *in the Chair.*

1811. Read letter requesting the Honorary Secretary to call a special meeting "to consider the question of damaged teas shipped during the monsoon."

1812. After reading letters from the Agents and Secretaries of various estates the following resolution was proposed by Mr. J. C. Parker seconded by Mr T. S. Gillatt and carried.

"It having just been brought to our notice that more than 150,000 lbs. of Wynaad Estate teas arrived in London in a more or less musty condition —the packages being mildewed—this Association is of opinion that the Calicut Coast Agents should be communicated with, and asked to give an explanation as to how this has occurred—seeing that no complaints were received by Superintendents from their Agents when the teas were received in Calicut."

1813. A letter was read from Mr. R. K. Walker expressing his opinion that until the Cochin Harbour Scheme becomes a reality we should combine to induce the South India Railway to materially reduce rates from Calicut to Madras, and arrange for shipment of all our teas during the monsoon months at the latter port as unless something is done insurance will soon become prohibitive if not impossible.

It was resolved: "That the Honorary Secretary address the Traffic Manager, South Indian Railway about this."

1814. *The late Mr. Mackinlay.*—Resolved: "That the Honorary Secretary write to Mrs. Mackinlay assuring her of the deep regret with which the members of this Association have heard of her loss, and of their sympathy with her."

(Signed) J. CARSON PARKER,
Chairman.

(„) C. E. ABBOTT,
Honorary Secretary.

Shevaroy Planters' Association.

Proceedings of a Quarterly General Meeting of the S. P. A. held at Victoria Rooms, Yercaud, on December 3rd, 1912.

PRESENT.—Messrs. F. Carey, E. Dickins, R. A. Gilby, P. Goubieât, S. M. Hight, A. P. Kinlock, A. B. Kundaswamy, J. C. Large, W. I. Lechler, C. G. Lechler, T. Manuel, F. Pegge, C. Rahm, W. Rahm, Revd. Rochêt, Revd. Spencer, Messrs. F. D. Short, L. E. T. Short, G. Turner, and Chas. Dickins (Honorary Secretary and Chairman). *Visitor*: Mr. D'Silva.

1. The notice calling the Meeting was taken as read.

2. With reference to Resolution passed at Meeting of 19th September, 1912 *re.* absence of Registrar's Clerk from office on office days. Read and recorded with satisfaction letter dated 30th September, 1912, from the Registrar, Salem District.

3. *Fertiliser Analyses.*—Read and recorded letter dated 23rd September, 1912 from the Planting Expert.

4. *Customs Duty on Coffee, Tea, and Rubber Machinery.*—Read Circular No. 39/12 dated 20th November, from the Secretary, U. P. A. S. I. Resolved: "That this Association do support a movement to have all machinery required for Coffee, Tea, or Rubber work made free of Customs duty.

5. *Election of Planting Member.*—Mr. E. F. Barber was unanimously elected Planting Member.

6. *Mr. Marden's Registration Scheme.*—The Honorary Secretary on introducing the subject to the meeting stated that he had made a mistake in his Annual Report in referring to the Scheme as Mr. Barber's. After a prolonged discussion of the Scheme it was proposed by Mr. W. I. Lechler, seconded by Mr. G. Turner and carried unanimously :—

"That in default of a better scheme, the rough copy before the Meeting be approved, provisionally, and forwarded with the suggestions of this meeting to the Committee appointed by the U. P. A. S. I."

(Signed) CHAS. DICKINS,
Hony. Secy. & Chairman.

PROCESS FOR PRODUCING "CAFFEINE-LESS" COFFEE.

The process of Friederick Meyer, Thornton Heath, Surrey, England, as patented in Germany, consists in putting the coffee into a suitable receptacle, a revolvable drum-sieve, for instance; then, from a reservoir, admitting a proper quantity of totuol, xylol or some other available solvent, and allowing these to act on the coffee while revolving the preforated drum, the solvent in the meantime being raised to boiling temperature by means of a convenient heating device. In a short time the caffeine is so completely extracted from the coffee beans as to be barely quantitatively recognizable. The caffeine solution is then drawn off and the caffeine and solvent weighed separately if desired. The coffee remaining in the sieve cylinder is freed from any remaining solvent by the passage through it of suitably heated air. —*Neueste Erfindaugen and Erfahrnngen.—The Spice Mill.*

CORRESPONDENCE.

To

The Editor of the *Planters' Chronicle*.

Dear Mr. Editor,—*Did* you see what the Editor of the " Ceylon Times " said in a leading article the other day ?—" No one pretends that the conditions of labour and pay that exist in Ceylon are such as would not afford grounds for very damaging attacks by people interested in stemming the tide of immigration into Ceylon from India "—Who'd have thought it ! Rather a different tone to the blatantly triumphant note of cocksureness of a few months ago when S. Indian Planters (especially of the Shevaroy variety) were fools, and the Messrs. Goodfellow just too cute for words ;

Somebody must have been telling secrets to the *Ceylon Times*, and it's not the first time that candid friends have been mistaken for enemies. The *Ceylon Times* will have lots of opportunities later on of giving vent to its feelings, I wonder whether it will adopt the " alas ! too true " tone, or revert to the paroxysmal shrieks of the alarmed jungle hen.—we must wait and see.

Yours faithfully,
(Sd.) AYLMER Ff. MARTIN.

To

The Editor of the *Planters' Chronicle*.

The Nilgiri Coffee Hybridisation Experiment Plot.

Sir,—I am unable to agree with your correspondent in his criticism of the Coffee Hybridisation Experiment Plot contained in " Nilgiri Notes' in your issue of 30th November.

In June a lengthy correspondence between the Local Committee and myself was published which may have shown some 'want of cohesion' between us at the outset, but I think matters were thrashed out to a satisfactory conclusion. At any rate my original plan of planting and working the plot has been adhered to. That Nilgiri planters do not care what will happen to the plot is an admission I am grieved to hear and one which I trust is not absolutely true.

I must really protest against your correspondent's statement that " no definite scheme of work has been formulated, or at least nothing that anyone knows anything about." The correspondence referred to above contains a formulated plan which is described in detail on page 355 of Vol. VII. This plan has not only been formulated but it has been carried out. Alarmed by your correspondent's criticism I went last week to inspect the plot and found that it had been planted up in accordance with my plan by Mr. Butcher and that it had been inspected by the local Committee. The following plots have been planted, *Arabica*, *Robusta*, *Marigogipe*. *Blue Mountain Arabica*, and *Mocha*, all containing twelve plants each with the exception of the last for which only five plants were available. This will be completed next year however. In addition to this two plots of existing hybrids were planted as long ago as last April, *viz.*, three plants each of the Hon'ble J. G. Hamilton's Hybrid, and the Saklaspur Hybrid (Mr. Crawford's) and two plots of three plants each of Ben Hope Hybrids No. 1 and No. 2.

This I consider to be a good start with material for future work. All the plants are planted 12 x 12 and the only variation of my original plan is that it was found impossible to leave a 24 foot space between each plot, and only 12 feet has been left.

The planting has been carefully done and despite the recent, heavy rain the plants look very healthy. The land is admittedly steep but not more so than very much other land under good Coffee in the Nilgiris.

In my opinion it would be a mistake to raise hybrids under too favoured conditions so that they will be pampered weaklings unable to thrive under estate conditions. The object is rather to grow them under such hard conditions that if they will grow in the Experiment Plot they will grow anywhere.

While on the subject I might take the opportunity to explain that the original correspondence between the local Committee and myself arose because they wished to adopt a process of *selection* while I had in view *hybridisation* to arrive at a disease resistant coffee plant. These two are different processes and while I agree that much good can be done by selection only, if the ideal result was obtained it would be a coffee plant resistant to the httack of Green Bug but still *arabica*, while if the ideal result of hybridisation is obtained it will be a coffee plant not only disease resistant but a new variety with improved vigour, yield, and possibly quality. In my opinion, *arabica* is not the best variety of coffee to grow and the object of my Experiment Plot was to obtain a better. I may say that the idea of selection work and isolated plants to be grown in the Ooty Gardens has been abandoned by the local Committee.

In conclusion, though your correspondent's experts may disagree. one at least is satisfied with the start which has been made and looks forward with confidence to the justification of the existence of the Experiment Plot.

Yours faithfully,
RUDOLPH D. ANSTEAD,
Planting Expert.

The Acting Chief Secretary to the Government of Madras writes under date Fort St. George, the 27th November 1912 as follows :—

To
The Chairman, U. P. A. S. I.

Sir,—I am directed to inform you that intimation has been received from the Government of India that the Royal Public Service Commission will assemble in Madras about the end of December and that its sitttings for the taking of evidence will commence on Wednesday the 8th January, 1913. For the assistance of witnesses the Commission has under preparation in England a set of preliminary questions which is expected to reach India shortly, but the Government are not yet aware how many witnesses the Commission will be able to examine while the selection of witnesses for examination will be made by the Commission itself. I am to ask whether the Planters' Association would be prepared to nominate one or more persons for examination before the Commission and in the event of the answer being in the affirmative I am to ask that the names of those so nominated may be intimated to me. As soon as the further instructions of the Commission have been received by this Government, a further communication will then be made to you.

I have the honour to be,
Sir,
Your Most Obedient Servant,
(Sd.) A. G. CARDEW,
Ag. Chief Secretary.

THE SCIENTIFIC DEPARTMENT, U.P.A.S.I.

Holes in Coffee Soil: – Last March the Scientific Officer paid a visit to Coorg by special request to examine a number of holes which appeared in the soil in very large numbers. A certain amount of mystery attaches to these holes, for no insect could be found associated with them at the time and many theories have been put forward to account for their presence. It is, however, becoming more and more certain that they were made by the emergence of a Cicada which appeared in large numbers in the district at the beginning of this year. The Government Entomologist, who was in Coorg recently, gave it as his opinion that the holes were caused by a Cicada, and he has kindly forwarded the following extract on periodical Cicada which appeared in the Entomological Section of the *Connecticut Experiment Station Report* for 1911.

"Some six or seven weeks after the eggs are laid in the twigs the young cicadas hatch from them, drop to the ground, and work their way into it, going twelve or eighteen inches beneath the surface. Here they live a subterranean life for seventeen years, where it is difficult to follow their movements and development. Yet this has been done in three or four cases by the Bureau of Entomology, and it was found that the larvae moulted four times, the fourth moult usually occurring about the tenth year. They burrow chiefly with their forelegs, suck the juices from the small roots from one-eighth to three-sixteenths of an inch in diameter, and upon such food they subsist for the full period of seventeen years, when *the pupae crawl out of the ground, leaving round exit holes about three-eigths of an inch in diameter. Sometimes these holes are very close together, and in several instances came out of the middle of a private road, where the ground was very hard and solid.* Earlier records of Brood II show that in some cases the pupae make cones, or huts, by raising the soil up around their burrows to a height of two or three inches. None of these were observed in Connecticut in 1911."

It is doubtful whether the actual presence of the holes in the soil does much damage, but the root feeding habits of the Cicada larvae, when they are in large numbers, might do a considerable amount of harm. The presence of the larvae of the cockchafer in considerable numbers in the soil in Coorg must also have a deleterious effect upon the coffee trees especially on young supplies. The Government Entomologist informs me that he caught a number of other insects when in Coorg the larvae of which are root-feeders. It is difficult to suggest a practical remedy on a large scale for these pests, but recent work with apterite in connection with the Mealy Bug Scale has proved so successful that it is probable that it will have a beneficial effect in the case of other root feeding pests. The Government Entomologist suggests the use of Tobacco waste which could be obtained from the factories at Trichinopoly and later on possibly from the factory which is being built at Bangalore. This waste should be put in a shallow trench opened about a foot away from the plant and about eight inches wide at the rate of one or two pounds per tree and covered over with soil. Our thanks are due to the Government Entomologist for the interest he has taken in the matter and the information he has so kindly forwarded.

It is hoped to publish an article describing the use of apterite and the results obtained with it on coffee estates in Coorg, at an early date.

R. D. A.

SOILS.

Secondary Actions of Manures.

By A. D. Hall, M.A. F.R.S.,

Director of Rothamsted Experimental Station.

The practical man uses the word exhausted not in its strict sense, but as signifying any conditions of the soil which lowers its crop producing capacity. For example, wheat is spoken of as an exhausting crop, although it takes out of the land only about a third of the plant food that is removed by a crop of roots. But because wheat occupies the land for the greater part of the year, during which time no inter-tillage can be carried on, the soil loses its texture and falls off in its mechanical condition. The lack of cultivation may also interfere with the availbility of the stores of plant food. At any rate, the land after a wheat crop is less productive, because of its lack of condition and not from any absolute poverty. For the same kind of reason then, nitrate of soda gets described as an exhausting manure, not because it robs the land in any special way, but simply because it sets up a bad texture of the soil which so easily leads to an inferior yield in the following crop.

The list of secondary interactions between fertiliser and soil which may have a potent influence on the value of the fertiliser in practice is not ended with the changes set up by nitrate of soda and sulphate of ammonia; there is plenty of practical evidence that the effect of applying potash salts such as kainit, muriate or sulphate of potash, is not wholly comprised in the provision of a certain amount of potash for the nutriment of the crop. In the first place it has often been remarked by those concerned with field experiments that cases occur when the addition of potash salts to a mixture so far from increasing the return actually reduces it. As a rule these results have been set down to the large experimental error which is inevitable in all field trials, but so convinced have been some experimenters of the reality of the effect that they have begun to speak of the "depressing effect of potash" upon the crop.

From the point of view of nutrition alone such a depressing effect is impossible; in some way the effect must be special to the soil and due to an unsuspected interaction between soil and potash fertiliser. A clue to the sort of action to be looked for may be found in the observations which have been recorded in some of the cases where the use of potash had resulted in a lowered yield, that the ground remains a little wetter after the application of kainit or other potash salts. As in the case of nitrate of soda, this apparent wetness has been set down to the water absorbing properties of potash salts, which are chiefly due to the magnesium chloride which is always present in them, but the small amount of water which is absorbable by an ordinary dressing of potash salts would be inappreciable when diffused through the soil.

The carbonate of lime in the soil next suggested itself as a possible reacting substance, and a series of experiments have shown that when weak solution of potash salts remain in contact with carbonate of lime a small quantity of free carbonate of potash is produced. The figures showing the extent of the reaction have not, as yet, been published, but the action is one of those cases where the amount of chemical change that is set up, depends upon the relative quantities of the reacting bodies, so that in the soil, where the carbonate of lime would generally be in great excess the proportion of the potash salts that could be converted into carbonate would be comparatively large. The investigation involves some further considerations of the part played by carbon dioxide, which is also present in the soil; and also of the results of partial washing of the soil as by rain; but the central fact has been established that soluble potash salts and carbonate of lime will react so as to produce carbonate of potash, which, like other alkalis, will bring about deflocculation of the clay.

All the effects of fertilisers upon soil which have been discussed are due to chemical changes of a comparatively minor order which were overlooked or not suspected when fertiliser actions first began to be studied, because in most cases the agent in the process is that part of the substance which possess no value as a fertiliser. For example, sulphate of ammonia was considered as a source of nitrogen only; the sulphuric acid it contained was entirely ignored and regarded as of no account. Similarly with nitrate of soda the nitrogen is the important part upon which its value as a fertiliser depends the mistake came in supposing that the soda was entirely without effect. The same state of affairs has occurred in the history of science. These second approximations, which may become large enough to override the main truth, often make themselves evident to the practical man, who delights in them as proofs that theory and practice do not always square, though theory can never be more than a method of explaining, and in its turn predicting the practice.

Among the results, some definite conclusions are that the long continued use of sulphate of ammonia on soils poor in lime results in the soils becoming acid. The acidity is caused by certain microfungi in the soil which split up the sulphate of ammonia in order to obtain the ammonia, and thereby set free sulphuric acid. The infertility of such soils is due to the way all the regular bacterial changes in the soil are suspended by the acidity; instead, fungi permeate the soil and seize upon the manure. The remedy, as may be seen upon the Woburn plots, is the use of sufficient lime to keep the soil neutral. From the Rothamsted soils carbonate of lime is being washed out at the rate of 800 to 1,000 lbs. per acre per annum, the losses being increased by the use of sulphate of ammonia, but lessened by farmyard manure or nitrate of soda. Nitrate of soda, when applied to heavy soils in large quantities, destroys their texture. Some of the nitrate of soda gets converted into carbonate of soda by the action of plants and bacteria, and carbonate of soda, by deflocculating the clay particles, destroys the tilth. The best remedies are the use of soot or superphosphates; the best preventive is the use of a mixture of nitrate of soda and sulphate of ammonia instead of either separately.—*Indian Planters' Gazette.*

RUBBER Seeds.

We learn that a good deal of interest has lately been evinced in regard to Hevea seeds for milling purposes, and there has been some enquiry going on regarding cost of collection. For making cattle food, and for other purposes the seeds, which now carpet the ground beneath the trees and are trodden on and otherwise destroyed, ought to bring in some revenue, however, small. If some reliable data can be framed as to quantity obtainable and cost of collection we feel sure a new industry either in the oil extracted, or cake made from it, will spring up, and may be of some benefit to the rubber industry when prices drop.—*Grenier's Rubber News.*

SISAL HEMP

Interest is being taken in Sisal Hemp cultivation and manufacture in at least one district in Southern India, and the following article by Mr. H. T. Macmillan which appeared in *The Tropical Agriculturalist* for November may therefore be of interest.

"With the gradual but constant demand for a supply of good commercial vegetable fibres, whether for textile, ropes, cordage or other purposes, there would seem to be a promising future for so valuable a fibre plant as the Sisal Hemp (*Agave rigida* var. *sislana.*) This plant furnishes the commercial and well-known Sisal hemp from its leaves, and has been in recent years somewhat extensively cultivated in South America, Hawaii, as well as in British, German and Portuguese East Africa. It bears long thick, succulent leaves, 4 to 6 feet in length, usually smooth-edged and ending with a terminal spine. The flowering or "poling" (from the fact that the inflorescence is produced on a long upright pole, 10 to 12 feet in height, which springs from the heart of the plant) takes place when the plant is about 7 to 8 years old. "Poling" affects the quality of fibre; therefore in order to preserve the latter the "pole" should be cut at about 3 feet from the ground, all ground suckers being also removed for the same purpose. If desired for propagation, however, the flowering pole should be allowed to grow, when on an average it will produce from 2,000 to 3,000 bulbils. The latter are an interesting provision of nature, since the plant produces no seed.

"When collecting the leaves for fibre the lower and older ones are taken first. This usually takes place in the third or fourth year from planting, when, under favourable conditions, an average of 25 leaves per annum may be obtained from each plant. Subsequent cuttings may be made at intervals of about six months until the plants should have furnished a total average of about 250 leaves. The plants then cease to be productive, and the ground should be cleared and replanted. It is, however, stated by some planters that a plantation may be maintained in a remunerative condition by merely removing the stumps of the old exhausted plants and thinning out the suckers to the requisite number, but this method is not considered satisfactory.

"With regard to yield, an experimental plantation formed in the Madras Presidency, (on a poor, red, gravelly soil,) with a rainfall of 23 inches, and concluded in 1911, is officially reported to have given an average yield of 3½ per cent. of fibre, the total return per acre (for 900 plants) being about 300 lbs. Sir Daniel Morris, however, estimated a return of 60 lbs. from 1,000 plants, while as much as 800 lbs. per acre has been recorded in an American report on Sisal hemp in Hawaii.

"The plant will thrive in either a dry or moderately wet climate and is not exacting as to soil, though the best returns are produced on good loamy land. It may be said that soil which would be too poor or dry for most other crops would suit the Sisal hemp plant. On average soils the suckers or bulbils may be planted at distance of 8 feet by 5 feet giving 1,089 plants to the acre. In the Madras plantation above referred to plants were spaced at 8 feet by 6 feet apart, that is at the rate of 900 plants to the acre."

In selecting land for Sisal or any Fibre cultivation, the chief object to be held in view should be the close proximity of water, for retting purposes. Machinery of the newest type available should be erected as close as possible to avoid expense of transit and overhandling both of which reduce profits.

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Scientific Officer's Papers.

CXII.—FUMIGATION OF PLANTS IN BANGALORE.

At the last Annual Meeting of the U. P. A. S. I., Mr. N. G. B. Kirwan, the Delegate representing the Bababudins, said that the point that he had been asked to bring up was the prevalence of Pulney Bug in the gardens of the local florists in Bangalore, and he believed, too, in the Lal-Bagh. The case had occured of a planter buying some orange trees and planting them on his estates and a few months after Pulney Bugs were found on the trees. Mr. Krumbiegel had been advertising for sale fruit trees from Australia, which many planters would like to buy if it were not for the fact that there was Pulney Bug in Bangalore. Could not some arrangement be made, he asked, by which the Scientific Department could look into the matter and stop the sale of such plants. It was a great danger to planters.

I said that I thought it would be better not to pass a resolution but to leave it to the Scientific Department of the U. P. A. S. I. to see what they could do, and this procedure was agreed to after one or two delegates had emphasised the urgency of the matter.

Accordingly, after having a personal interview with Mr. G. H. Krumbiegel, the Economic Botanist for the Government of Mysore, and finding him in sympathy with our views I wrote him as follows on 12th September:—

"In view of the fact that the scale insect, *Lecanium viride*, which was introduced into the Nilgiri Hills some years ago, has done an immense amount of damage to the coffee there, so much in fact as to have killed large acres of it and cause this cultivation in many places to become unprofitable and lead to its abandonment, it is of the utmost importance to guard against a similar introduction of this pest into the coffee growing districts in the Mysore State where it has not yet made its appearance.

"That there is a distinct danger of its introduction is shown by the fact that the scale is present in Bangalore and that only last year it was actually introduced into the Mudigere District on some Citrus plants taken from Bangalore to an estate garden. Fortunately the pest was recognised in time and the outbreak stamped out.

"A large number of ornamental and economic plants are annually sent from Bangalore to planting districts in the Mysore State and elsewhere, and I think you will agree with me that some decided steps should be taken to prevent the spread of scale insects and other diseases through this channel. Legislation on the subject is undoubtedly needed but the time is not yet ripe for it.

"Referring to our conversation on the subject of 27th August, I beg to suggest to you that the Lal-Bagh Gardens should lead the way by fumigating all plants sent out from their nurseries, &c., to planting districts, and thus ensure that at least one centre of distribution supplies disease free plants as far as insect pests are concerned.

"Fumigation is adopted in a large number of agricultural countries and I speak from experience when I say that it is cheap, easy, and effective

A fumigating chamber is required, built away from other buildings and I have found that one built of cement with inside measurements 10 foot cube is a useful size. If this is fitted with moveable lattice work shelves it will hold a large number of small plants while, when the shelves are removed, it will hold a fair number of large plants like crotons and mangos. The door must be made with a wide flange, packed so as to ensure tightness when it is closed.

" I feel sure that if such a practice were adopted at the Lal-Bagh it would have a most beneficial educative effect. Not only would the planters know that they could be sure of getting plants free from scale, but by giving demonstrations, through the medium of the recently formed Horticultural Society, the process could be popularised and the local horticulturalists gradually encouraged to adopt similar precautions. When they actually saw that the process was cheap and easy they would be willing to adopt it probably, especially in competition whith the Lal-Bagh nurseries.

"The process of fumigation does no harm whatever to even the most delicate plants provided that the foliage is dry at the time when they are exposed to the Hydrocyanic acid gas.

" I sincerely hope you will be able to see your way to develop this suggestion of mine and I await with great interest your views on the subject. I need hardly say that I shall be at all times only too ready to afford any information or help in my power in fitting up a chamber and carrying out the process."

On the 4th December I received the following letter from Mr. Krumbiegel :—

" In reply to your letter No. 678 dated 12th September, 1912 on the subject of Fumigation of Plants, I beg to state that I am, as already verbally mentioned to you, fully in agreement with the suggestions made by you.

" We have now erected in the Lal-Bagh a Fumigating Chamber and all plants and, if necessary, seeds, coming in from other places as well as all that are being sent out to the districts will be in future fumigated. I shall also send a notification to the local nurserymen and members of the Horticultural Society and of private gardeners, asking them to avail themselves of this fumigating installation. I shall be glad to fumigate for them any plants at the actual cost price of the chemicals only. I shall esteem it a favour if you can make it convenient to come and see the arrangements made and will be glad of any further advice you may have to offer on the working of it."

I have inspected the Fumigatorium which has been erected at the Lal-Bagh and I find that all arrangements have been made for the proper treatment of plants, cuttings, &c sent away from these gardens and in future it will be quite safe for planters to obtain plants from the Lal-Bagh. This does not as yet apply to other gardens in Bangalore, but an effort will be made, through the medium of the Horticultural Society, by means of lectures and demonstrations, to persuade Bangalore horticulturalists to understand the necessity for fumigation and to establish fumigating chambers of their own, and guarantee that plants sent out by them are free from insect pests and have been treated.

This will lead in time to the adoption of similar methods of treatment to free plants from fungoid diseases.

I think it will be agreed that an excellent start has been made and that we should congratulate Mr. Krumbiegel on his forward policy and thank him for so promptly meeting our wishes.

RUDOLPH D. ANSTEAD, *Planting Expert.*

THE SCIENTIFIC DEPARTMENT, U.P.A.S.I.

A Caterpillar Pest of Tea.—Specimens of a caterpillar which is attacking Tea in the Nilgiri-Wynaad District were recently forwarded by Mr. J. S. Nicolls. The Caterpillar is probably *Heterusia cingala* though at present no perfect insects have been bred out to make certain of the determination. Watt and Mann in their book on *The Pests and Blights of the Tea Plant* recommend the following remedies for this pest:—

"The caterpillars should be collected and destroyed whenever seen, together with cocoons and even more especially the moths, which are brilliant and easily seen, and all the dead leaves should be swept up from below the bushes and burned. The caterpillars are fortunately subject to the attacks of a parasitic fly (*Exerista heterusiae.* Coquillet). This fly fastens its eggs upon the back of the caterpillars the young maggots penetrate the body of their host and feed on its contents, taking care not to touch any vital, spot until they are ready to undergo their own transformations. The diseased caterpillar has usually sufficient strength to spin its cocoon, but collapses without turning into a chrysalis. The sudden disappearance of this pest, after reaching its climax, is usually due to the work of this useful parasite, though sometimes a bacterial disease is still more effectual in the work of extermination."

Mr. Nicolls writes of it, "One of my fields has been attacked with a lot of these and I have twenty coolies picking them off and destroying them. They seem to attack only the old leaf and not the young ones." Writing on the 5th of December, Mr. Nicolls says, "I must have collected over 30,000 slugs now and the total goes on increasing. I pay 2 annas per hundred for them at present to get coolies keen to go out after work and look for them. There is no doubt that they can do harm and I should advise your calling South Indian Planters' attention to my having come across the beast in very large quantities. I have not looked for parasitic fly attacks." The latter point is important and a number of cocoons should be collected and placed in a glass jam pot with the mouth covered with fine muslin to see if any flies can be bred out.

Writing again on 11th December, Mr. Nicolls says that he has now collected 146,000 caterpillars. He continues, "After turning to the chrysalis stage the dead leaf with the chrysalis falls off and lodges in amongst the lower branches of the tree, or falls on the ground. I have found them all over the estate now, in some places in scattered patches and close to the boundary of other estates who so far report no signs of the slug. Without they were in quantities you might easily pass them by as they are invariably amongst the old leaves, but you migbt be struck by the apparent leafless state of the lower branches of a tree after a bad attack. If the slug had gone into the cocoon stage the cocoons might be amongst the dead leaves on the ground."

Mr. Nicolls reports that he thinks he has found a parasite, as he has got a cocoon full of small maggots. This is being kept under observation. He asks whether if all the leaves and twigs after pruning were buried it would kill the pest or whether the moths would still be able to emerge. If properly buried it would kill all the moths which on emergence from the cocoons would not be able to work their way through the soil; but the safer plan would be to sweep up all prunings and dead leaves, &c., quite clean and burn them.

R. D. A.

DISTRICT PLANTERS' ASSOCIATIONS.

North Mysore Planters' Association.

Proceedings of the Quarterly General Meeting, held at Balchonnur, on December 2nd, 1912.

PRESENT.—Messrs. C. H. Browne, C, Danvers, C. S. Crawford, A. F. Evetts, H. G. Bonner, Thos. Hunt. (President), W. H. Reed (Honorary Sectetary). *By Proxy.*—Mr. S. L. Mathias. *Visitor.*—Mr. J. Grant.

Re-arrangement of Subscription to Assistant Scientific Officer Fund:—Resolved—" That this Association is agreeable to raise the rate of subscription to the U. P. A. S. I. to 2 annas, provided the S. M. P. A. and B. P. A. are prepared to re-arrange their guarantee to the Asst. Scientific Officer Fund, so that all three Associations be on an equal basis."—*Carried.*

Registration Scheme.—After some discussion the Scheme was generally approved of.

Soil Analyses.– About 30 samples were promised at the meeting, other members were to be circularised.

Resignation of Representative on London Chamber of Commerce.—Read Circular No. 40/12 dated 25th November 1912 from the Secretary, U. P. A. S. I.—Resolved—" That Mr. Grant, of Messrs. H. Allan & Co., be asked to act as representative on the Chamber of Commerce, London ; should Mr. Grant be unable to act, that Mr. Owen, of Messrs. Sanderson & Co., be asked to represent the U. P. A. S. I."—*Carried.*

Election of Planting Member.—Mr. E. F. Barber was unanimously elected.

Roads. General complaints were made regarding the bad state of the following roads—(1) Chikmagalur—Kadur, (2) Magundi—Kalasa, (3) Magundi—Balur, (4) Kottigahara—Kalasa (between 5th and 8th Mile). Resolved—" That the Honorary Secretary do write to the Mysore Government drawing their attention to the neglected state of the above roads."

(Signed) W. H. REED,
Hony. Secy. & Chairman.

PLANTING MEMBER OF COUNCIL.

The election of a representative of the Planting Community to the Legislative Council of Fort St. George has taken place and Mr. E. F. Barber of Ootacamund has been elected by the United Planters' Association of Southern India to represent it. The Chief Secretary to the Government of Madras, Legislative Department, has been notified of the fact and the election will appear in due course in the Fort St. George Gazette.

REGISTERED ADDRESS OF THE SECRETARY, U. P. A. S. I.

The Members of the United Planters' Association who have occasion to telegraph to the Secretary, U. P. A. S. I. are reminded that his registered address is " Planting " Bangalore.

THE PLANTERS' LIBRARY.

Soil Conditions and Plant Growth by Dr. Russell.

No one, with reason, could require a commander on active service to employ the intervals between his engagements in writing a history of the campaign. All that is expected is that he should despatch reports from time to time showing the progress which his army is making. Later on, when peace broods again over the land, the historian will tell the story and apportion praise and blame with the cold and cruel justice of the student. So, also, whilst the arduous work of building up a science is in progress, it is not reasonable to expect anyone engaged in that service to write a finished and final account of the operations which are bringing the campaign slowly to a successful issue.

Hence, in taking up Dr. Russell's new volume on "Soil Conditions and Plant Growth," though we may expect it to contain luminous reports of the progress of the army of biochemists in their work, we must not look for a finished story nor for final statements. We shall be content if we learn from headquarters that the operations are proceeding smoothly, and that steady advance is being made.

Looked at from this standpoint, there can be no doubt that Dr. Russell's monograph is eminently successful. It shows that he and his fellow-workers in the Old and New World are beginning to evoke scientific order out of the chaos of observed facts.

No horticulturist requires to be reminded that the soil is a material of extreme complexity, that it is the seat of complex chemical operations, and that it is the natural home of vast numbers of micro-organisms all drawing nourishment therefrom and adding waste substances thereto. Hence it is not necessary to emphasise the difficulty which attaches to investigation into the science of the soil and the crops which it bears. What is worth while perhaps is to note that the agricultural chemist has also, and at last, realised the complexity of the problems presented by the soil. In consequence of his having learned this lesson, agricultural chemistry is passing through a transition stage

Gone is the curt confidence which marked its earlier manner. It no longer attempts to apply off-hand the chemistry of the laboratory to the field. It recognises that the chemistry of the soil is not that of dead things only, but is the chemistry of the living, of the dying, and of the dead. So profound has been the effect of this discovery, that agricultural chemistry has joined hands with biology, and has even gone so far as to change its name. It is now a branch of the great science of biochemistry.

Though changed in name, its purpose is still the same—a high and splendid purpose though vastly difficult of achievement. That purpose is no less than to discover the laws which lie at the foundation of all good practice.

In its early, confident days, agricultural science sought to accomplish this object by seeking in the plant or soil for the "Principle of Vegetation." Successive pioneers announced, in the not-uncertain tones which science is apt to use, their several discoveries. Van Helmont, who grew a Willow twig in water in a pot of earth, found that in the course of five years it had gained several hundreds of pounds in weight, though the earth in the pot weighed only 2 ounces less at the end of the experiment than at the beginning. Hence he was able, by neglecting the 2 ounces of lost soil, to proclaim that in water he had discovered the principle of vegetation. Another 17th century agricultural chemist, Glauber, announced that saltpetre constitutes this principle. Others preferred the claims of humus, and Jethro Tull, the great Oxford husbandman, insisted that the particles of soil themselves, if only small enough, were the principles; that the roots of plants had mouths—albeit very little ones—and the end of all good practice was to prepare the plant's pabulum by breaking up the soil as finely as possible. Thus, through many vicissitudes of speculation, agricultural chemistry toiled after agricultural practice—which had had a start of countless centuries—intent on explaining to the grower the mysteries of the soil and its relation with the plant. The slow growth of this scientific knowledge is traced in detail by Dr. Russell In an admirable introductory chapter to which the curious reader may be referred. This youthful, sanguine phase of agricultural chemistry endured even until our own times, for we ourselves have known chemists who thought that to present a soil analysis to an inquirer was to solve his problems as to soil treatment. That phase, however, is over, and Dr. Russell's work marks the second transitional phase between the simple naivete of ignorance and the simple certainly of assured knowledge.

This being the state of the science—so many scattered pieces of fact awaiting the fitting together—it is no disparagement of Dr. Russell's work to say that it fails to complete the picture. Nevertheless, by assembling the scattered pieces of the soil puzzle, and by showing that they are susceptible of association into a finished whole, the auther has made a noteworthy contribution to the progress of the science. It is apparent, from what has been said already, that Dr. Russell's work must be studied piece by piece, section by section, rather than as a whole.

Studied in this way the work will prove of great assistance, not only to the agricultural chemist, but also to the gardener To the latter it will prove by no means easy reading, and this because the narrative is, perforce interrupted at every stage by the introduction of the evidence in support of the statements of the narrative. Far from suggesting that this is a defect, we hold that it is such a merit as to make the volume specially to be commended to the young gardener. For not only is it full of useful information, but it offers exercises—of which many of us stand in need —in the estimation of the value of evidence. The ordiuary text book tells you facts, but Dr. Russell's monograph adopts the harder, wiser method of giving you the evidence for the facts.

To give but one illustration, namely, that which deals with the influence of water supply on the effectiveness of manures; every gardener knows in a general way that if a plant receives insufficient water it is unable to derive full profit from manure. But the evidence which Dr. Russell offers shows this in striking and exact measure. Thus, if soils containing different amounts of water are treated with small doses of nitrogenous manure, the plant in the drier soil is not able to make any use of the manure; that in the somewhat moisture soil is able to use the first dose, but gets no advantage from the second; whereas the plant in the well-moistened soil is able to use with advantage all the nitrogen supplied.

We have cited the example, not so much because of its intrinsic importance, but because we know that many a young gardener learns but slowly and with difficulty the art of using artificial manures. A failure or two, due to an insufficienty considered use of this or that artificial manure, is apt to bring him into the ranks of the " disbelievers in artificials," whereas if he will but devote himself to mastering the essential facts and to realising the complexity of relations which obtain between plants and the soil, he will discover that the discriminating use of artificials is one of the secrets of successful practice.—*The Gardeners' Chronicle*

LABOUR IN INDIA.

The labour question in india is one of the most difficult to tackle, especially the matter of crimping. Opinion is more or less divided, and the want of unanimity makes the case more difficult. The Government of India is consequently at a loss to come to any definite decision, and awaits for the problem to ultimately solve itself. There is every probability of gardens, except a few more favoured ones, being short of labourers this year, unless arrangements can be made for local labour, which in some cases is impossible. The outlook in fact is not promising, except in the case of favoured gardens. This means, nothing more nor less, than a shortage in production next season, if we read the signs of the times correct. Contemplated extensions will have to be curtailed, and even more favoured estates, if they go in for intensive cultivation, will have to cut their coat according to their cloth. The labour problem is the one thing that will keep in check the production of Indian tea in the future. The scarcity of labour is, however, being felt in other countries, and is conducing to a shortage rather than an increase in production in future years until the labour difficulty is solved. If consumption increases it will mean a rise in prices again, and then the contemplated 1*s.* canister will again disappear, giving place to the 1*s.* 4*d.* canister at present in vogue. India, we think, will always hold the premier place, and it will lie with the producers to decide whether it will pay them best to go in for quality rather than quantity. Poor Indian teas are a drug on the market at present, but are doing useful service in extending the consumption, they being preferred to other countries for use in blends. Their present cheapness favours their reception. So it is perhaps not an unmixed blessing that is happening to the Indian tea industry. Rich quality teas will always realise high prices, and those gardens noted for will do well to stick to them, as it will pay them well. Our advice for next season, is for these gardens which can produce quality, not to attempt quantity, leaving it to the poorer gardens to supply the deficiency. This will avoid a slump in the market and enable both parties to make a profit. Gardens that can turn out really decent teas should not compete with less favoured ones to their disadvantage. It is a case of "live and let live." The Indian tea industry, as we showed in our last issue, is not at present in a favourable statisical position, as shown by the Board of Trade Returns. It therefore behoves the bosses to consider the status and make such amendments as are necessary. If they will consider the position, and act accordingly, there is every hope that the Indian tea industry will never be swamped by outside competitors. But there is danger in neglecting the warning. The present policy of deluging the markets, both locally and in London, with inferior teas, which cannot pass muster, is suicidal in the extreme. Need we say more on the point? Surely the Directors and Managing Agents of Companies have had their eyes opened to existing facts. We can only hope that the mistakes of this season will not be repeated next year. The planting community may say what they like, but the final verdict as to the quality of the teas lies with the tea tasters in London and Calcutta, and there is no gainsaying their decision. It lies with them, and they are fully qualified to state their pronouncements, which cannot be disputed.

The Labour question in Ceylon is still unsolved. The *Times of Ceylon*, in a notable article in its issue of the 26th November 1912, states the case clearly and shows up the position in its trne light. It writes;—"It is pretended by some sagacious people that if only the newspapers kept perfectly quiet for a time the labour question in Ceylon would speedily be settled. Other less optimistic souls are always predicting all sorts of dire calamities resulting from the trade secrets that are given away by irresponsible anonymous letter writers in our columns. These writers, it may be mentioned, are never irresponsible, but are usually people well known to ourselves who at least have the opportunity of being well informed on the subject with which they are dealing, but upon whom the yoke of anonymity is imposed by the probability that those in authority over them who have less opportunity of studying the subject would disapprove of their views. Well, never have those who believe in the cult of silence had a finer opportunity of working out the salvation of the planting community of Ceylon. For more than six months the labour question has had an almost complete rest in our columns, and it has moreover, in its general aspects been left entirely alone by most, if not all, District Planters' Associations. We should be glad to learn that the labour question has benefited by this prolonged holiday; but we fear that such is not the case. It is true that labour is coming in better than it was, but that is due, not to any change in the conditions under which labour is employed, but partly to climatic factors on the Coast and partly to the much greater efficiency of the Labour Agency under its new chief. Advances are not going down, but going up; there is an enormous amount of local recruiting in progress; and the coolie is still getting deeper and deeper into the mire of indebtedness. It will be remembered that last January the Planters' Association arrived at a number of momentous decisions, which. if carried out, we think few people will dispute, would remedy the present barbaric conditions under which the Tamil coolie earns his daily bread in this Island, and place Ceylon in a position of equality with the Federated Malay States in the competition for labour. The matter was taken up as strenuously as it was at the time because of the urgent necessity of the planters 'putting their house in order' before the Mannar railway is opened. However, the old bogey of legislation, which has frightened to death so many efforts at reform in Ceylon, once more interposed. As the result of the visit of a Commission to South India resolutions were passed by the Planters' Association which required the force of a legislative enactment in order to be of any utility. The principle of legislation had already been approved by the home proprietors as represented by the Tea and Produce Committee in London, so that one of the most serious obstacles had already been removed. By the time, however, the time had come for the Joint Committee, consisting of planters and Colombo agents, to place the matter before the Attorney-General the anti-legislation forces had had time time to recover; the Committee appointed never approached the Attorney-General because the Mercantile Members refused to join it, and the lengthy meeting at Kandy, proved purely a wasted effort. Some sort of a compromise was arrived at, this being that an effort would be made to raise the membership of the Labour Federation from fifty to eighty per cent., which it was thought would place it in a position practically to give the same force to resolutions such as those passed at Kandy as if they were made the law of the land. Eight months have elapsed since then, and the Labour Federation appears to be as far off as ever from this commanding position which it sought to secure. The day of the opening of the 'land route' to Ceylon is now close at hand, and there is no hope of the situation being cleared by the time it arrives, The impetus that will be given to immigration by the opening of the railway will be counter-acted by the increasing unpopularity which the Island has gained, as was early shown by Messrs. Drummond Hay and J. B. Coles' report owing to the indebtedness of the coolie and his constant victimisation by the *kangany*, Not even universal free passage to the estate, which would help enormously to popularise this country, has been adopted owing to this terrible bogey of legislation which obsesses so many people concerned with Ceylon estates. During the last five years, when we have had in the Island a Governor so anxious to assist in the solution of the labour question, and a Colonial Secretary so thoroughly acquainted with it, the planters have thrown away an opportunity which will probably never occur again, and the fact that it was not seized will some day, we are afraid, be bitterly regretted. In trying to avoid one large imaginary danger planters and proprietors in Ceylon are running into a much more serious danger. No one pretends that the conditions of labour and pay that exist in Ceylon are such as would not afford grounds for very damaging attacks by people interested in stemming the tide of immigration into Ceylon from India. But this is a menace that apparently accounts for nothing as compared with the vague terrors which any form of legislation possesses for some people—terrors which are totally unaffected by the spectacle of our neighbours in the F. M. S. working hand-in-hand with their Government and in possession of a contended labour force totally free of the incubus which weighs so heavily on the coolie in Ceylon. An indication of the real dangers which beset the Ceylon labour force may be gleaned from a telegram which appears elsewhere. Not until our position is made sounder than it is in Ceylon can we afford to laugh at the calumnies which are uttered by enemies in Southern India."

The telegram referred to above reads as follows :—

"At the second day of the Tanjore District Conference at Pattukotai on Sunday, the 24th November 1912, Rao Bahadur K. S. Venkatarama Iyer (Negapatam) moved 'that this Conference urges on the Government to frame rules under the Indian Emigration Act XVII of 1908, providing that an intending emigrant should be required to produce before the protector or registering officer a certificate from the village magistrate to the effect that at the time of emigration there is no subsisting labour contract to which he is a party.' In doing so he said that in consequence of the enormous emigration of labourers out of the country there was a great drain and dearth of labour for agricultural operations. Recruiting agencies decoyed ignorant and credulous coolies, mostly by foul means. and oftentimes coercion and intimidation were employed by them to secure possession of coolies once captured by them even against their own will, when they desired to be rescued from their custody. False and exaggerated accounts of their wages and prospects in the Colonies were given to the credulous coolie by wily recruiters, and returned emigrants whom they kept for their own purposes were exhibited before him in the colour and glitter of their personal jewellery said to have been acquired with savings from their earnings. To reduce them in their nefarious methods of recruitment they were assisted by the collusion of police both of the railway and district, and by the railway staff and plague preventive staff of the Municipality stationed at Railway stations, the profits of the transaction being divisible amongst them, On being seconded by Mr. C. Sundram Iyer (Mayaveram) the resolution was put and carried. Dr. T. N. Nair, the President of the Conference, in concluding the proceedings said that when he travelled as a member of the Factory Commission this shortage of labour appealed to him in every factory that he visited, nearly every factory being deficient of its full complement of labour, the deficiency ranging from 15 to 25 per cent. They had heard appeals and exhortations addressed to them that day from that platform and at other times from other platforms for reviving their drooping industries, to start mills to establish manufactures, but supposing all this was done, supposing that they possessed the resources and genius for organisation, and energy and enterprise for it, had they sufficient labour in the country to work their mills and factories? That was the question for them to face. They were so much dependent upon the Government for the removal of the evils they were suffering from that they turn to look for legislative remedies for this excessive emigration of labour to the detriment of their country's best interests. Their duty was to show that these coolies were enticed away under false pretences and placed beyond the reach of help or rescue. There was yet another side to that question, viewed from the humanitarian aspect. It had most revolting features to present. Women were kidnapped and used as prostitutes. The whole question of emigration wore an ugly aspect, and men and women, who were said to be recruited for emigration, required protection even it be against themselves."

Our Colombo contemporary naturally takes the side of its own Colony planting community and we do not blame it for so doing. At the same time we think it rather hard on the other side to be told that they are uttering calumnies and are enemies. Surely Southern India has the first call on its labourers, and if it is depleted, to its loss, of its best class of agriculturists and workmen, we think the members of the Tanjore District Conference were fully justified in their action. We have all along consistently pointed out that the drain of labourers to the Colonies from Southern India is inimical to the best interests of the Madras Presidency. The above telegram only confirms our statement. Why Assam planters should not have the preference to the British colonies is one of those paradoxes which puzzle us. Why the Southern India planting community object to Assam recruiting when the planters of that Province would only take a small proportion compared with those who are yearly taken to the Colonies is what surprises us. Surely Assam, which is part and parcel of India itself, should have the perference, if preference is to be. We pointed out the danger to Southern India long ago and asked it to " wake up." It appears to be doing so now, not a day too soon.—*Indian Planter's Gazette and Sporting News.*

LABOUR PROSPECTS.

The most plausible argument against the future output of plantations is that of shortage of labour. It is true that most plantations are at times short of labour, but I think this must generally be attributed to the manager's desire to keep down expenses. Out of a total of 227,985 coolies employed on Malayan plantations 126,665 or rather more than half, were imported from India. The average period of service on the plantation does not exceed two years—although many of these return after a holiday in their native land, and the difficulty is to engage during the recruiting season the exact number that are required to make good the probable departures during the rest of the year, without becoming burdened at the beginning with labour for which there is not profitable employment.

Within two years the plantation labour force has more than doubled. I do not believe that by increasing the rate of wages any great stimulus would be given to Indian emigration. Tamil coolies are more easily recruited for some plantations at half the wages paid on others which are unpopular, owing to unhealthiness or to some other cause; and this fact is becoming more clearly marked, since those employed at the lowest rates have found themselves able to remit more than half their earnings to India, and that their savings in three or four years are sufficient to establish them as capitalists when they return to their native villages.—***Rubber World.***

RUBBER.

Thinning-out Hevea Estates.

VIEWS FROM SUMATRA.

It is not very easy to lay down any hard and fast rule as to number of trees to aim at for the final number per acre, but in my opinion on absolutely flat ground it should not be more than 75 to 80 per acre, while on undulating and hilly ground it may be round 100 per acre. This applies more especially to our rich soils here, where growth is big and fast.

There are two reasons for not planting too close :—

(1) The soil will not nourish the trees and the root systems have not sufficient room.

(2) The branches get interlocked, shutting out light and air. The lower branches quickly die (giving entrances for disease,) and the tree, instead of having a large head with many leaves, grows long and lanky, with much wood and little foliage.

How far No, 2 affects the bark renewal no one can say with certainty, but that it does there is no doubt in my mind, after seeing the good results pruning has had here and there in this country. No. 1 can perhaps be by manuring ; No. 2 to a certain extent by pruning ; but in the long run both Nos. 1 and 2 must be treated by thinning out.

From observation here on 8 and 8 years old trees, 24 ft. by 24 ft. would seem a good distance, and this would probably be quite far enough apart for many years to come. After the trees have safely reached this age, there should be no great loss annually, if properly looked after. The diseases which we know at present will have in all probability quite disappeared, and jungle roots and timber gone also.

But 24 ft. by 24 ft.. or 75 trees per acre, seems rather a waste of space in the earlier years when tapping has already commenced, and the tops of the trees are not yet very big. Therefore I should be inclined to plant my rubber trees 24 ft. by 12 ft., equal to about 151 trees per acre. This will allow plenty of light and air up to say the 6½ to 7½ year, will give us a large margin for losses between the 2½ year and the 7½ year, and when it is necessary to cut out by cutting out trees as necessary, and as time goes on in the 12 ft. rows, will give us a fairly regular plantation.

Planted 24 ft. by 12 ft. up to 2½ years old, it should be quite feasible to replace dead trees, as on two sides such a tree will always get light and air, and will not be overshadowed, as should be the case if all were planted 12 ft. by 12 ft.

After 2½ years it is not worth replacing trees.

This leaves us 75 trees to die out, or be thinned out if necessary, per acre. An ample allowance, as after 3 to 3½ years the percentage dying out on good soil and a well run estate should be very low. As the trees come to 8 and 9 years old, it will be seen whether it is necessary to thin to as low as 75 trees per acre (24 ft. by 24 ft.)

Now as to the best methed of thinning out, this would entirely depend on the state of the plantation. If the trees were very regular both in growth and planting it would be best to take out alternate trees, but if very irregular in growth and planting, as so many of the old coffee estate rubber trees are, then backward trees only should be taken out. One sees hundreds of trees that can never come to anything, supplies put in long after they had a chance to get any light, etc.

It is of course better to keep one's plantation as regular as possible, but good trees should never be sacrificed to this. Four trees close together with *plenty* of room round them, will grow quite as well as four trees spread apart over the same amount of ground.

As regards immediate removal of trees to be thinned out, or first extracting all possible latex. This will depend on a number of circumstances. Where an estate is hard up, it would probably pay to tap and tar the trees at 6 or 8 feet, and continue tapping. These trees will not die, but will send out long suckers seeking the light. These suckers will not greatly interfere for some time with the trees left standing. I do not advise pollarding, but cutting off at 6 to 8 feet. These trees can be heavily tapped as soon as shoots begin to show, and would prove most useful for teaching coolies to tap, and for inferior coolies. During the time these topped trees are being tapped (say one year) over all available bark, and as low down to the roots as possible (the heaviest yield is there) the remaining trees will be improving their crowns, and after the year is out will be giving an increased flow, while on most estates young trees will be coming in. Thus the rubber crop should not fall off very greatly.

Of course a number of trees can be taken out root and branch immediately, as being too small for tapping. Later all these tapped trees must be entirely removed with their roots and destroyed.

I see no particular reason to fear disease in connection with thinning out, provided it is recognised that it will be an expensive job and must be done thoroughly, and too much is not taken in hand at once. Complete destruction of all dead wood is of course essential. Roots will give the most trouble.

Finally, the whole question is one more for common sense and individual decision and care, than for any hard and fast rule. Different soils, elevations, etc., etc., will all play a part. The most difficult thing is for any planter to sufficienty harden his heart to start the necessary and often drastic treatment required.

All the above of course applies where there is no catch crop. I hope the above opinions may be of some use.

Yours truly,
J. VERSCHOYLE CAMPBELL,

—*The India Rubber Journal.*

SISAL HEMP.

In connection with the Sisal Hemp industry of the East Africa Protectorate (this *Bulletin*, 1911, 9, 71, 306; 1912, 10, 522), an association has been formed, representing planters, merchants, and others, and termed. "The British East Africa Fibre Association." The principal objects of the Association are to study and give advice on methods of producing, standardising and grading fibe, to report on the fluctuations of the market and the prices realised, to keep its members informed of matters connected with fibre-growing in various parts of the world to give advice with regard to machinery, to negotiate for the reduction of freights, and to endeavour in various ways to secure the best possible returns for planters. Further particulars of the Association are given in the *Agric. Journ., Brit. East Africa* (1912, 4, 103).—*Bulletin of the Imperial Institute.*

The Planters' Chronicle.

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Scientific Officer's Papers.

CXIII.—THE PEST ACT IN ENGLAND.

In Sc. O. Paper No. 109 (Vol. VIII. p 567) when discussing the prevention of the introduction of insect pests and fungoid diseases of plants it was mentioned that in England the Board of Agriculture issued orders making pruning of Gooseberry bushes attacked by disease compulsory and also enforced compulsory spraying of fruit trees to deal with the American mildew.

A recent issue of the *Gardeners' Chronicle* contained the orders issued by the Board of Agricultural in England, from which it appears that under the Destructive Insects and Pests Order of 1910, sixteen pests are scheduled, and there are in addition three other special orders. The following digest of these may prove of interest:—

(A) The Order of 1910 states:—

The occupier of any premises on which an insect or pest mentioned in the schedule to this Order exists, shall forthwith notify the fact, with particulars of the time and place of discovery, to the officer appointed by the Local Authority to receive such notices, or, if no such Officer has been appointed, to the Board; and, where practicable, a specimen of the insect or pest shall accompany the notice.

An Inspector or other officer appointed in that behalf by the Local Authority and any Inspector of the Board may, upon production if so required of his appointment, or authority, enter any premises on which he has reason to believe that an insect or pest mentioned in the schedule to this order exists, or has recently existed, and examine any plant, fruit, crop, seeds, tubers, bulbs, layers, or cuttings, on such premises.

Every person, who shall knowingly use, or sell for use, for planting any plant, seed, tuber, bulb, layer or cutting attacked by an insect or pest mentioned in the schedule to this Order, or any seed, tuber, bulb, layer or cutting which has been derived from a plant so attacked and is capable of spreading the insect or pest, shall be liable on conviction to a penalty not exceeding £10.

It shall not be lawful, except with the written permission of the Board, to import, sell, or offer for sale a living specimen of any insect or pest mentioned in the schedule to this Order.

(B) The Order of 1911 specifies as follows :—

The occupier of any premises on which there is a bush ("Bush" is defined as a Gooseberry bush or Currant bush, and includes a cutting, stock, or seedling, and any part of a bush except the fruit.) which is, or appears to be, diseased, shall, forthwith, notify the fact by post or otherwise to the Board or to the clerk to the Local Authority, or to an Inspector of the Board or of the Local Authority, and where practicable a specimen showing the disease shall accompany the notice.

This Order further requires that no bush shall be moved from any garden in which disease exists or appears to exist until after an investigation by the Local Authority, who may at any time and from time to time, by a notice served on an occupier of infected premises require him to adopt such measures for prevention of the spread of the disease as are also authorised by the article and specified in the notice.

The landing in Great Britain of any bush brought from any place out of Great Britain (except the Channel Islands) is prohibited, except that this provision does not apply to the landing of any Currant bush under the authority of a license authorsing such landing previously obtained from the Board of Agriculture and Fisheries.

(C.) The Wart Disease of Potatos Order of 1912 provides in the same way as the other two for notification of the existence of the disease, and orders that no tubers shall be removed from any premises on which the disease exists or appears to exist until after investigation by the Local Authorities, who are empowered to prohibit the planting of Potatos in the infected premises except under prescribed conditions. It is further provided that : —

It shall not be lawful to use any diseased tubers for planting, or to sell or offer for sale diseased tubers for that purpose, and an Inspector of the Local Authority acting under their directions may, by a notice served on the occupier of any infected premises, prohibit the removal of any tubers from the infected premises, except under such conditions as the Inspector acting under such directions may consider necessary to prevent any diseased tubers being so used or sold or otherwise disposed of for planting.

(D) The American Gooseberry-mildew (Fruit) Order of 1912 prohibits the sale or exposure for sale of diseased Gooseberries, and further prohibits the importation of Gooseberries from any place outside Great Britain (except the Channel Islands), except when the package is labelled "Imported Gooseberries," and bears the name of the consignor and the country and district of origin. Cleansing of packages which have contained diseased Gooseberries is also provided for.

The Destructive Insects and Pests Acts under which the Board of Agriculture and Fisheries can take action in this way was passed by Parliament in 1907 and was an extension of an Act of 1877 passed to deal with the Colerado Beetle, a great scourge of Potatos in America, which it was felt was a menace to the English crop if it once became established. Its eradication was successfully accomplished by help of this Act by the Agricultural Department of the Privy Council, now the Board of Agriculture and Fisheries.

RUDOLPH D. ANSTEAD,
Planting Expert.

DISTRICT PLANTERS' ASSOCIATIONS.

Kanan Devan Planters' Association.

Proceedings of an Extraordinary General Meeting of the K. D. P. Association held in the High Range Club, Munnar, on Saturday, 23rd November, 1912.

PRESENT.—C. Fraser, Esq. (*in the Chair*). Messrs. D. Mackintosh, G. E. Bewley, A. H. Dixson, W. L. Ranking. Dr. J. S. Nicolson, M.D. Messrs. H. S. Smith. M. C. Koechlin, J. C. Swayne, A. J. Wright, W. A. Lee, A. W. John, G. W. Cole, S. H. Paulet, J. H. Jeffrey, J. A. Gwynne, A. G. Murray, A. Yates, J. M. Bridgman, B. T. Laudale, H. L. Pinches, W. J. Dixson, A. W. L. Vernede, W. Fraser, E. A. Hughes. (Honorary Secretary).

Messrs. John Carless and C. Rowson, by their Proxy Mr E. A. Hughes.

The notice calling the Meeting having been read, it was proposed by the Chair :—" That the Minutes of the last Annual General Meeting having been printed and circulated be taken as read and confirmed." This was carried *nem con.*

The following agenda was laid on the table :—

(1) To vote for the additional Planting Member for the Legislative Council of the Government of Madras,

(2) To elect the Delegate for the Sri Mulam Popular Assembly,

(3) To consider the Finance Committee's redrafted rules of the S. I. P. B. Fund,

(4) To consider the proposed Registration Scheme for labour,

(5) Correspondence.

The Honorary Secretary having read the rules with regard to the voting for a Planting Member, voting papers were distributed and ballot carried out in due form, with the following result :—

For Mr. E. F. Barber 23, for Mr. J. A. Richardson 4, total 27.

The Honorary Secretary was asked to inform the Secretary of the U. P. A. S. I. in due course of the result.

The Chairman in a few well chosen words proposed : That Mr. A. J. Wright be again elected to attend the Sri Mulam Popular Assembly as the K. D. P. A. Delegate." This was carried *nem con.* The Chairman then said that as this was the first occasion on which they had met since the last Sri Mulam, he would ask the Meeting to pass a hearty vote of thanks for the good work Mr. Wright had done as Delegate and for the trouble he had taken in forwarding their interests. This was carried unanimously. Mr. Wright thanked the Meeting very heartily for the honour they had done him in re-electing him as Delegate and also for the vote of thanks for the work he had done. He said it was a great pleasure to be able to help the Association and assured them that at the coming Assembly he would do his utmost to forward their interests in every possible way.

. On introducing the 3rd item in the agenda, the Chairman remarked that there was a good deal of correspondence with reference to the matter. He was certain himself and felt sure that Meeting would agree that the administration of the S. I. P. B. Fund was at present in safe and capable hands. The Finance Committee was a thoroughly reliable and business one and the Fund interests would be administered by them to the best possible advantage. As they were pressed for time he would ask the Meeting to allow the Honorary Secretary, who was one of the Finance Committee, to explain the proposed alterations as shortly as possible without reading the whole correspondence on the subject. Mr. Hughes then explained the proposed alterations which were unanimously approved, and was asked to write to the Secretary of the U. P. A. S. I. to this effect.

With regard to the proposed Registration Scheme, the Chairman said that every one present had received a copy and had ample time to consider it fully. He was sure all agreed that any scheme to put labour conditions on a better footing was most desirable and deserving of their utmost support, but any attempt at compulsion or restraint with regard to labour, beyond a certain point, was a more in the wrong direction. They had received the following letter criticising the Scheme from Mr. Martin, which he would ask the Honorary Secretary to read to them.

Mr. Hughes then read Mr. Martin's letter as follows:—

"My dear Hughes, *Scheme of Registration.*—I return the printed leaf you gave me. I consider the Scheme unworkable and inadvisable. I shall leave its unworkableness to be explained by others, for I am quitr sure this will be done in many quarters and I shall confine myself more or less to its inadvisability. No scheme, not even this one, can stop emigration. We admit, at least I do, that coolies like every one else, have a right to work in any part of the world where they can make the best living. This Scheme would certainly annoy emigrants to some extent at first, but as soon as it was found that as second-class or even first-class passsengers to the Straits or elsewhere, they would be free from the annoyance, they would emigrate just the same. Rupees 20 per head would not be a deterrent to estates that must have labour, for this would only have to be paid for defaulters whose finger prints were registered in India and not on the vast bulk of cooly emigrants. Are you going to examine the fingers of every first-class passenger simply because his skin is black or because he smells a bit? I am inclined to think that in the end, this Scheme would encourage emigration, for, were I a cooly, I should prefer to emigrate rather than submit to the troubles of registration, after I had cleared myself from my first experience of it. The Scheme might enable a Registerer to catch persons whose finger prints are registered—true, but having caught them, what can be done with them? The coolies have only to go to the nearest Magistrate and say they do not wish to work with Mr. Registerer, and claim the protection of the Court. What then? Are we to return to the days of slavery and the lash? Again, how many planters, after, say a year's working, are going to take the trouble of returning paid-off coolies' imprints? Even if a very few neglect to do this, to what confusion will it not lead. Once more, who is going to pay the cost of feeding coolies while experts make up their minds how many of the gang are, and how many are not registered, and while correspondence is passing? If I can't go to Ceylon from Mangalore, what is to prevent my going to Thondi and shipping from there by native craft without going before any Emigration or Government Officer, or asking leave of any one at all.

"Let us for a moment suppose that all difficulties have been overcome and the Scheme is put in force, Can Government justly refuse the same rights to Indian planters of rice and other products? They suffer in the same way as European planters and why should their registered coolies be allowed to emigrate from British India to Travancore or Mysore? Our last state would indeed be worse than our first. On more general grounds, the Scheme is inadvisable being in the nature of Class Legislation, and conceived in the interests of one class of the community. It would be a retrograde step, in that it differs from the only sound principle, which is to give coolies such pay and treatment as will induce them to work for us. In these days it is insufficient merely to offer a good article; the article itself must be advertised. We must let it known far and wide what we offer coolies and point out the disadvantages of countries trying to induce coolies to emigrate. A friend of mine had as co-passengers on boardship a few years ago, a goodly gang of coolies going to Natal; he asked them why they did not work for us instead of emigrating and their reply was that they had never heard that coolies were wanted by us. That was my fault, and not the fault of the coolies. If the Scheme was compulsory, I can only repeat what I have said before, that it would amount to a dragooning of the agricultural population to which it is to be hoped no Government would agree, and to which no freeman should submit, while if not compulsory, it will certainly prove unworkable. Our district has its troubles in getting sufficient labour, and sometimes in keeping it. I feel so sure that the Scheme under consideration would add to them, instead of alleviating them, that I would refuse to join in it. In conclusion, I would like to express my admiration of the ingenuity displayed in an attempt to meet every point that could arise under such a scheme where it at work, and my thankfulness to the authors of it for having spared the time, and taken so much trouble on behalf of all of us, to arrive at some method of helping us in the most difficult of all problems which face the community, a difficulty which is bound to increase every day. In something much simpler than this scheme the solution will be found.

Yours sincerely,
(Signed) A. Ff. MARTIN."

The Chairman then proposed that the Meeting go into Committee to discuss the matter. A considerable amount of discussion took place and the Scheme was gone into very thoroughly. Its advantages and disadvantages being carefully considered. On return to open Meeting, the following Resolution was proposed by the Chair :—

"That this Association while considering that any scheme to prevent the enticement and emigration of advanced labour, is both advisable and necessary, considers the present scheme unworkable and inadvisable, but will heartily support any proposal more feasible and effective." This was carried unanimously.

The Honorary Secretary then read a letter from the C. T. P. A., Peermade, dated the 12th November, containing that Association's Resolution:—

"That the Honorary Secretary do write to all other Planters' Associations in Travancore and ask them for their support in asking the Travancore Government to legislate with regard to labour in Travancore only."

The Chairman said that any attempt to ask for Government interference with regard to labour was a very serious matter and wanted the most careful and cautious consideration, and he hoped all Members would give the matter their most careful attention before coming to any decision. After considerable discussion, it was proposed by Mr. Pinches and seconded by Mr. Wright "That this Association do not consider it advisable to ask Government for legislation with regard to the Estate labour in Travancore." This was carried unanimously.

Read a letter from the Honorary Secretary of the same Association with regard to the rate of subscription to U. P. A. S. I. by affiliated Associations. It was proposed by the Chair "That this Association while recognising the advantage of all other Associations paying on a 2 anna basis did not consider it advisable to endeavour to enforce this." They hoped, however, that all other Associations would eventually come in at this rate. Carried unanimously.

Read letter from tne Government Planting Expert, saying that he would visit the District sometime during the months of January, February, or March. The Honorary Secretary was asked to write to Mr. Anstead and inform him that the members would be very pleased to see him at any time during these months he found most suitable.

The Honoray Secretary then said he regretted that, so far, response to his circular asking for subscriptions to the S. I. P. B. Fund had been very poor. He pointed out that the Fund was a most deserving one and a list was then circulated. The following subscriptions, in addition to those already paid, were promised :—

			Rs.	A.
J. A. Gwynne, Esq.	...	...	10	0
A. Yates, Esq.	...	...	10	0
A. W. John, Esq.	...	...	10	0
W. L. Ranking, Esq.	...	..	10	0
H. S. Smith, Esq.	...	...	5	0
A. H. Dixson, Esq.	...	...	10	0
W. Fraser, Esq.	...	...	10	0
L. H. Ley, Esq.	...	...	5	0
J. B. Ingram, Esq.	...	...	10	0
D. Mackintosh, Esq.	...	...	5	0
W. A. Lee, Esq.	...	...	10	0
S. H. Paulet, Esq.	...	...	7	8
A. J. Wright, Esq.	...	...	10	0
		Totas	Rs.112	8

A vote of thanks to the Chair terminated the Proceedings.

ERNEST A. HUGHES,
Honorary Secretary, K.D.P.A.

LETCHMI ESTATE, *3rd December, 1912,*

Malabar Coast Planters' Association

Proceedings of an Extraordinary General Meeting held in the Trichur Club, on 30th November, 1912.

PRESENT.—Messrs. A. H. Mead (in the Chair), Campbell Hunt, C. W. Clode, R. de Roos Norman, H. Waddington, H. C. Plowden (Honorary Secretary).

Notice calling the meeting having been read the minutes of the last Meeting were taken as read.

Planting Member.—The meeting proceeded to vote in accordance with the rules published in the *Planters' Chronicle* of November 2nd, Mr. E. F. Barber's candidature was supported unanimously.

Resolved : "That this Association considers that Mr. Guy Owen should succeed Mr. Sanderson in the London Chamber of Commerce."

Labour Registration Scheme.—Resolved : "That the Honorary Secretary do write to the Secretary of the U. P. A. S. I. informing him that this Association considers the scheme unworkable as regards the labour in our districts."

A vote of thanks to Mr. E. Lord having been passed thanking him for his services as Chairman of this Association, it was resolved: "That Mr. Plowden carry on the Association as Chairman and Honorary Secretary." Mr. Mead agreed to draw a scheme for a District Association with branches and to submit that same to members in Malabar, Cochin and Travancore with a view to altering the constitution of this Association at the next General Meeting to be held in January.

The Proceedings closed with a vote of thanks to the Honorary Secretary of the Trichur Club thanking him for the use of the room.

(Signed) A. H. MEAD, *Chairman.*
(„) H. C. PLOWDEN, *Hony, Secy.*

THE PLANTERS' LIBRARY.

The Journal of the Madras Agricultural Students' Union.

We have been favoured with a copy of the first number of this new Quarterly Journal of Agriculture which is to be the organ of the Union which is composed chiefly of the past students of the late College of Agriculture at Saidapet and of the new Coimbatore College and of present students of the latter Institution. The Saidapet College was closed after 30 years' work on account of the soil on the Farm being unsuited for experimental work and the work begun there is now being continued at Coimbatore.

.To quote from the Preface, "this Journal is primarily meant to draw the old and the new students into closer bonds of fellowship with a view to turn out some useful work. Prominance will, therefore, be given in the Journal to the publication of what may be called 'College News.' Old students will be made acquainted with information that may interest them with reference to what is taking place in the College. Notes summarising the work of the experimental stations will be an important feature of the Journal. It is proposed that the subjects treated of should, as far as possible, have a practical aspect and with this object old students and other correspondents will be requested to send contributions stating practical experiences and personal difficulties omitting all subjects which may have the least political tinge in them. It is hoped that the Journal will supply a real need not only for the old students of the College but as well for others who may be interested in the progress of the agricultural condition of the country, as for instance, the enlightened Zamindars, landlords, and members of agricultural associations of the Presidency, and those who wish to be in touch with what is being done by the new Department of Agriculture for the welfare of India."

Of the 63 pages of this first issue the majority are taken up with accounts of the College Day Celebration and the Agricultural Conference and so are of more interest to the College students than to the general public. There are, however, several scientific articles; the first by S. L. D'Silva dealing with the subject of the diseases and injuries of the horns of cattle and dehornation. The second article is by Dr. Mann, the Principal of the Agricultural College at Poona, on 'Local Bodies as Agents in Agricultural Improvements.'

The third scientific article is a summary of a lecture delivered by Dr. Barber at the Agricultural Conference at Coimbatore last year, on "Sugarcane Seedlings in India" Dr. Barber has recently been appointed Government Sugarcane Expert and is to study the development of new seedling canes for India. The usual method of propagating sugarcane is a vegetative one, namely by cuttings. but if new varieites are to be obtained these must be got by crossing different kinds of canes and obtaining seed from them. These lines have been adopted with considerable success in Java and by the Imperial Department of Agriculture in the West Indies. As Dr. Barber points out "it is hardly necessary to emphasise the fact that the cane industry in India is in a very unsatisfactory condition. Although the greatest sugar producer in the world none is exported, such good canes as are present are grown on a very small scale or are heavily diseased and the vast majority of the cane growing tracts have, perhaps, the worst canes in the world to rely on. The raising of seedling canes in India seems, therefore to be a very necessary proceeding."

As will be seen from these few extracts this new Journal promises to be an interesting one and we wish the authors every success in their enterprise.

COFFEE.

Robusta Coffee.

Of the several species of *Coffea* discovered within recent years in tropical Africa, notably in the Belgian Congo, the most important from the practical point of view is that commonly known as *Coffea robusta*, yielding "Robusta" coffee. This plant was found to offer considerable advantages over other coffees, especially in its quick and robust growth, its early bearing and heavy yield, and its comparative freedom from the attacks of leaf-disease fungus. Robusta coffee has, therefore, for some time past received considerable attention at the hands of planters in different parts of the tropics, particularly in Java, where its cultivation may now be said to have passed the experimental stage. Enquiries received at the Imperial Institute show that the published accounts of Robusta coffee are not readily accessible to planters interested in the new crop, and it has therefore been thought desirable to bring together the more important features of the experience gained with regard to the cultivation of the plant and the preparation of the finished product.

At the outset it may be stated that the somewhat extravagant hopes at first entertained of Robusta coffee, more especially in relation to its resistance to disease and to the quality of the product, do not at the present time appear likely to be entirely realised.

The valuable papers of Messrs. Cramer, Gallagher, and Labroy have been laid under special contribution in the compilation of this article.

HISTORY AND NOMENCLATURE.—The difficulties met with in the botanical nomenclature of Robusta coffee are in large measure bound up with the history of the plant. According to Dr. Cramer, the plant was first put on the market by a Belgian firm, who had obtained supplies from their representative, M. Luja, by whom the plant had been discovered in the Congo. The new coffee was described as *C. robusta* on account of its vigorous growth, but its close relationship to *C. Laurentii* De Wild., and *C canephora* Pierre, and its varieties, was early recognised, and from these two species it was distinguished with difficulty. Cramer from a study of living material of "*C. robusta*" and *C. Laurentii*, concludes that the two plants are identical, in which case "*C robusta*" is more correctly described as *C Laurentii* De Wild., a species discovered in 1898 by Emile Laurent in the Belgian Congo. The question, however, cannot yet be regarded as finally settled.

Supplies of Robusta coffee plants were first sent to the East in 1900, in which year young plants, in Wardian cases, were despatched to Java. By the beginning of 1901 the coffee had been planted on several estates in Eastern and Central Java with promising results.

CHARACTERS OF THE PLANT.—In certain vegetative characters, *C. robusta* would seem to occupy the same relative position with regard to *C. liberica*, as does that species to *C. arabica*. Robusta coffee grows more rapidly than Liberian, a plant eight months old being much taller and possessing more branches and leaves than Liberian coffee twelve months old. The plant is of a more robust habit, and the leaves, though variable in size, are larger than those of *C. liberica*, but thinner and of a lighter green colour. The branches, however, have a tendency to bend downwards, so that the bush becomes somewhat umbrella-shaped. Like *C. liberica* the plant flowers throughout the year, flowers being intermediate in size between those of the species named and of *C. arabica*. Perhaps the most striking feature of Robusta coffee is the large number of berries borne in the numerous thick clusters, each of which contains on an average 40 to 60 berries, though larger numbers are frequently met with. The berries are much smaller than in Liberian coffee, but, since the pulp is thinner, the beans are markedly different in point of size from those of *C. arabica*. Gallagher states that on an average 10 cwt. of Liberian berries give one cwt. of marketable coffee, while only 4 cwt. of Robusta berries are required to yield the same amount. In the case of the latter coffee, many more berries go to the cwt. than is the case with Liberian coffee, but the greater number on the branches renders the picking "if anything, cheaper." The red pulp is easily removed, as is also the thin parchment.

QUALITY OF THE COFFEE.—Considerable variation is to be found in the opinions expressed as to the quality of Robusta coffee, but it is not improbable that such differences are in some measure to be explained as a result of different methods of preparation, not all of equal excellence. It is stated that the beans do not possess a first-class colour, and that for the first two crops a good aroma is lacking. De Wildeman affirms that the flavour recalls that of Liberian coffee, but with less aroma, Hart compared Robusta coffee with the coffees of Costa Rica and the East Indies; while, according to Cramer, the quality of well-prepared Robusta coffee is approximately that of middling Arabian coffee. The beans possess a bluish-green colour. similar to that of the Arabian product, but they are of a somewhat different shape, being larger and more convex on the curved side.

In preparing Robusta coffee for consumption it is necessary that the beans should be well roasted, and it is stated that the coffee loses less weight during this process than is the case with other kinds.

MARKET VALUE.—A fair amount of Java Robusta coffee has been offered on the London Market, where it ranks with Brazilian coffee and meets with a ready sale, the value in May 1912 being 73*s*. to 75*s*. per cwt. for "ordinary to well-picked parcels." At that time supplies were reported to be scarce and enquiries for the coffee were being received by brokers.

THE PLANTING INDUSTRY.—At the present time the planting of *C. robusta* on a commercial scale is practically confined to the Dutch East Indies, notably Java. As stated above, the first consignment of the plants reached Java in 1900, and since that time the area under this crop has rapidly increased, particularly in the eastern and central districts of the island. Within two years of its introduction, the species was regarded as worth the serious attention of planters, and, by 1905, the area planted was restricted only by the limited supply of seed at that time available. In 1909 a conservative estimate placed the area under Robusta coffee at about 30,000 acres, and since then further rapid strides have been made. As an indication of the popularity of the crop in Java, it may be mentioned that in 1908-9 the area planted in the Malang district was approximately 12,000 acres, with no more than 60 acres under *C. liberica*, while *C. arabica* had been abandoned.

Two systems of cultivation have been adopted in Java with regard to Robusta coffee. Attention has hitherto been devoted chiefly to growing the coffee as an intercalary or catch-crop with Para rubber, for which purpose the crop seems in certain particulars to be well adapted. The coffee has also been recommended as a satisfactory catch-crop for cocoanut plantations. Planters, however, are now growing Robusta coffee itself as a main or permanent crop with good results. It may be mentioned that the industry has been greatly helped by the Government, who have established nurseries and arranged for the free distribution of young plants to natives.

Experimental cultivations of Robusta coffee have been made in several parts of the tropics, but up to the present time no considerable plantations have been laid down other than those in the Dutch East Indies. The plant has been successfully grown in Trinidad, Dominica, the Gold Coast the Philippines, the Federated Malay States, and elsewhere, but no progress has been made. The most probable explanation of this state of affairs is the comparative lack of interest in coffee displayed by planters as a result of the dominance of Brazil as a coffee-growing country. Samples of Robusta coffee grown in the Gold Coast may be seen in the Gold Coast Court in the Public Exhibition Galleries of the Imperial Institute.

Cultivation.

Experience with Robusta coffee as a plantation crop has been gained chiefly in Java, and the following notes on the cultivation of the plant are based on published accounts of the work done in that country.

CLIMATE.—In selecting a site for the plantation particular attention should be directed to secure adequate protection from the wind since the plant will not flourish in exposed situations. Natural wind-breaks will of course be utilised, if available, but in their absence it will be necessary to provide protection by planting trees for this purpose. Experience in Java has shown that the plant flourishes at all altitudes between sea-level and 3,000 feet, especially favourable results being obtained at Malang at an altitude of 1,000 feet. The finest plantations occur in the humid districts of Eastern Java, where the heavy rainfall is equally distributed throughout the year. While preferring an abundant and regular rainfall, *C. robusta* appears to be capable of withstanding a certain degree of drought, as instanced by experience in certain districts in the south of Java, where the plant has been known to survive a dry season of nearly four months, quickly recovering after the onset of rains.

SOIL.—The root-system of *C. robusta* is well developed and of rapid growth, and in young plants the roots are found largely to occupy the top soil. As would be expected under such circumstances, compact, heavy, or clayey lands are unsuited for the crop, which thrives best in a deep, light, sandy loam rich in humus. Peaty lands, especially when deep and badly drained, are unsatisfactory, but can be improved by good drainage and liberal applications of lime. Gallagher asserts that practically all the inland plantations in the Federated Malay States possess soils which are admirably adapted to this coffee.

SHADE.—In Java the crop is always grown under shade, but the planter considers this question from different standpoints according as the coffee is grown as a main crop or as an intercalary or catch-crop with cocoanuts or Pará rubber. In the latter circumstances the rubber or cocoanuts will afford the shade necessary, but in the former case special shade trees must be provided. Leguminous trees are especially valuable for this purpose and in Java *Caesalpinia (Peltophorum) dasyrachis* and *Deguelia (Derris) microphylla* have been particularly successful; formerly, Para rubber was advised for the same purpose, but Cramer states that in large, pure plantations of coffee. the shade afforded by isolated trees of this species is unsatisfactory, not only on account of its comparative lightness but also as a result of its absence during the dry season.

Nurseries.—On certain plantations in the East all the Robusta coffee has been raised from seed at stake. The trees appear to be successful, but the general consensus of opinion is that the best results can only be obtained by first raising young plants in a nursery and then setting them out in the plantation. It is stated that *C. robusta* is very readily transplanted. The preparation of the nursery beds is a matter of considerable importance. The soil should be very carefully prepared and reduced to a fine tilth, and, at a height of about six feet, provided with a deep shade that can be gradually reduced as the young plants become older, in order to inure them to the sun before being planted out. Cramer recommends that a "germinating bed" should be established, in which the seeds (the finest procurable) should be sown thickly with a view to transferring the best of the seedlings, as soon as they can be shifted, to the nursery, where they are planted at a distance of about 12 inches apart. When about nine months old, the young plants are ready to be stumped previous to setting out in the plantation. If the seeds are planted direct in the nursery, they should be set about 6 in. apart and the plants transferred to the plantation when they possess four or five leaves.

PLANTING-OUT.—When seedlings are employed, the usual procedure should be followed, the plants being set out with a ball of earth adhering to the roots. In the case of stumps this is unnecessary, the tap-root being cut back before the young plant is put out. The distance between the plants varies with the circumstances of the plantation, but is somewhat less than that usually adopted for Liberian coffee. When planted as a permanent crop, experience in Java shows that satisfactory distances vary from 7 feet by 8 feet to 10 feet by 10 feet, the plants being arranged quincuncially, *i.e.*, with an additional plant at the centre of each square formed. Gallagher, however, states that in the Federated Malay States the best distance is 12 feet by 12 feet, with a further plant in quincunx. When the coffee is to be interplanted with Pará rubber, the distances will naturally depend upon those of the main crop. The catch-crop should be arranged in rows between the rubber trees and as a working basis it may be taken that 5 feet should be the minimum distance between the coffee plants, and 7 feet the minimum distance between the coffee and rubber trees. Thus, in a plantation with rubber set out at 30 feet by 15 feet, four rows of coffee can be planted in the wider avenues, giving about 960 plants per acre.

CARE OF THE PLANTATION.—Experience has shown that the cost of maintenance of a Robusta coffee plantation is less expensive than when other varieties of coffee are concerned. Epiphytes do not grow on the trees, and when the latter are fully established, the ground is sufficiently shaded to prevent weeds obtaining any great luxuriance. Gallagher, however, points out the necessity of keeping the plantations perfectly free from weeds. He advises hand-weeding, since, if cutlasses or mechets are employed, the labourer is apt to wound the lower parts of the coffee stems, with the resulting formation of unnecessary branches. These latter should be removed as soon as they appear. It is stated that the effect of weeds gaining the upper hand in a plantation is a reduction of crop, even to the vanishing point; but the coffee will not be permanently affected if clearing is not unduly delayed, since the trees will recover their normal health in the course of a few months after satisfactory conditions have been restored. The soil should be forked over at the end of the second year, and the process repeated annually.—*Bulletin of the Imperial Institute.*

(To be continued.)

COOKING BY SOUND.

Coffee Roasted in Three Minutes.

The avowed object of the lectures and demonstrations in Common Sense Cookery in Health and Disease given at the Offices of the Society of Medical Officers of Health, Montague-Street, Russel-Square, is, in the words of Mr. William Lawton, the Demonstrator, " to turn things upside down with regard to cooking generally." Yesterday he gave a demonstration of cookery by sound, and to the satisfaction of his audience revolutionised the method of roasting coffee. When he offered to roast coffee in three minutes the coffee roasters doubted his veracity, for according to ordinary methods the time taken is from twenty-five to forty-five minutes. Mr. Lawton demonstrated for the first time with a perforated coffee roaster of his own invention. The idea is by turning the handle of the machine at a certain speed the beans are thrown into the air; the heat passes through, and the coffee is roasted in suspension. A quantity of ordinary Costa Rica coffee beans were placed in the roaster, and the handle was turned. By-and-by there was a cracking noise, an indication that the process of roasting was nearing completion. When the cracking sound became general, that was the signal that the beans were roasted exactly to the requirements of the amateurs of good coffee. The beans were roasted to the light brown colour to suit English tastes. By turning the handle half a minute longer a ticking noise was heard. A succession of ticks was a warning that the beans were roasted to a degree desired by Frenchmen, who prefer all the oil inside. It is claimed for this new method of roasting that the heat from the gas makes the roaster selfcleansing, for everything is burnt as the beans fly through the air. After the roasting process a number of the light brown beans were split. They were shown to be perfectly cooked. The demonstrator expressed his preference for a mixture of coffee roasted in the English and French fashions—two-thirds of the light brown beans and one-third of beans with the oil on the surface. It is popularly supposed that the beans should be ground as soon as roasted, but Mr. Lawton's theory is that the beans should be kept two days. The beans, after being roasted to light brown, are from 25 to 50 per cent. larger, and their size is increased 50 per cent. when roasted in the French style. If strong coffee is desired the latter beans with the oil on the surface are used. Beans roasted two days ago in a little over three minutes were ground, and four heaped dessert spoonsful were placed in a coffee pot, and a pinch of salt added. Three pints of water were boiled and poured over the coffee. To this was added a little cold water. The coffee was now ready for serving, and cups of it were handed round. There was no doubt about its fine flavour. Its taste was voted excellent by several members of the audience, who wanted to know how much the coffee would cost per pound. The answer was a shilling.—*Morning Post.*

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GUATEMALA.

The August number of the *Bulletin* of the Pan-American Union states that the production of coffee in Guatemala in 1911 amounted, in round figures, to 712,500 quintals (about 645,00 cwts.). At the close of that year there were 2,156 coffee plantations in the country, comprising an area of 880,320 acres planted with 68,161,626 coffee trees.—*Board of Trade Journal.*

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